

# **SAMM**

*Stand Alone Mosaicking Module  
for Forward-Looking Sonar*

## **User Manual**



Oceanic Imaging Consultants, Inc.  
1144 10th Avenue • Suite 200  
Honolulu, Hawai'i 96816-2442  
Phone 808.539.3706 • Fax 808.791.4075  
Email [support@oicinc.com](mailto:support@oicinc.com) • Web [www.oicinc.com](http://www.oicinc.com)

Copyright © 2014 Oceanic Imaging Consultants, Inc. - Printed in the United States of America (USA). All rights reserved.

This manual and all other related documentation are protected by copyright and distributed under licenses restricting its use, duplication, distribution, and recompilation. No part of this Manual or related documentation covered by copyright herein may be reproduced in any form or by means -- graphic, electronic, or mechanical -- including photocopying, recording, taping, or storage in an information retrieval system, without the prior written authorization of Oceanic Imaging Consultants, Inc.

The products described in this manual may be protected by one or more U.S. or foreign patents, and pending applications.

Oceanic Imaging Consultants, Inc. retains the right to make changes to the contents of this Manual at any time, without notice. Oceanic Imaging Consultants, Inc. makes no warranty for the use of its products and assumes no responsibility for any errors that may appear in this document, nor does it make a commitment to update the information contained herein.

© Oceanic Imaging Consultants, Inc.  
1144 10th Avenue • Suite 200  
Honolulu, Hawai'i 96816-2442  
[www.oicinc.com](http://www.oicinc.com)  
Telephone: 808.539.3706  
Fax: 808.539.3710  
Email: [support@oicinc.com](mailto:support@oicinc.com)

#### **TRADEMARKS**

SAMM is a trademark of Oceanic Imaging Consultants, Inc., in the U.S.A. and other countries. Third party trademarks are the property of their respective owners and should be treated as such.

#### **WARNING AND DISCLAIMER**

Every effort has been made to make this manual as complete and as accurate as possible, but no warranty or fitness is implied. The information provided is on an "as is" basis. The authors and the publisher shall have neither liability nor responsibility to any person or entity with respect to any loss or damages arising from the information contained in this book or from the use of the CD or programs accompanying it.

**Rev. 2/2014**

# Table of Contents

<b>1</b>	<b>WELCOME TO SAMM .....</b>	<b>1</b>
<b>2</b>	<b>SYSTEM REQUIREMENTS AND SETUP.....</b>	<b>2</b>
2.1	Sensor and Input Requirements.....	3
2.2	System Requirements.....	3
2.3	Install SAMM .....	4
2.4	Launch SAMM.....	5
2.5	Create or Open a Project .....	5
<b>3</b>	<b>THE GRAPHICAL USER INTERFACE .....</b>	<b>7</b>
3.1	Mosaic Window.....	7
3.2	Main Toolbar.....	7
3.3	Mosaic Toolbar .....	8
3.4	View Toolbar.....	8
3.5	Status Bar.....	9
3.6	Swath List.....	10
3.7	Forward Look Window .....	10
3.8	Live Info.....	11
3.9	Playback Controls.....	11
3.10	Sonar Controls.....	11
<b>4</b>	<b>CONFIGURE SAMM.....</b>	<b>12</b>
4.1	Projected Coordinate System.....	14
4.2	Sensor Offsets .....	14
4.3	Display Units.....	15
4.4	File Size.....	16
4.5	Swath Colormap .....	17
4.6	Rendering Method .....	17
4.7	Reset Windows Button.....	18
4.8	Configuration Tutorial.....	19
<b>5</b>	<b>LOAD CHARTS .....</b>	<b>21</b>
5.1	Basic vs. Advanced Interface .....	21
5.2	Raster vs. Vector File Types .....	21
5.3	Retrieve NOAA Electronic Navigational Charts.....	21
5.4	Elements of the Basic Chart Display Options Window .....	22
5.4.1	Basic Chart Display Popup Windows .....	23
5.4.2	Using the Basic Chart Loader .....	24
5.5	Elements of the Advanced Chart Display Options Window .....	25
5.5.1	Buttons.....	26
5.5.2	The Folders Tab .....	27
5.5.2.1	Populating the Charts Database .....	27
5.5.3	The Chart Preview Tab .....	28
5.5.4	The Charts Tab.....	29
5.5.4.1	Color Coding.....	29
5.5.4.2	Manually Loaded vs. Folder Added Chart Behavior.....	30
5.5.5	The Log Tab .....	31
5.6	Advanced Chart Loader Tutorial.....	31
5.7	Chart Customization Commands.....	31
<b>6</b>	<b>ADD FILES OR BEGIN ACQUISITION .....</b>	<b>33</b>
6.1	Add Files in Playback or Post-Processing Mode.....	33
6.2	Interface with Metadata Sensors .....	35
6.3	Interface with a Forward-Looking Sonar.....	36
6.3.1	Kongsberg Mesotech M3 .....	36
6.3.2	Teledyne BlueView 2D Multibeam Imaging Sonar .....	37

6.3.3	Tritech Gemini 720i and 720id .....	38
6.3.3.1	Troubleshooting .....	39
6.3.3.2	Sonar Controls .....	40
<b>7</b>	<b>DISPLAY AND PROCESSING SETTINGS.....</b>	<b>43</b>
7.1	Adjust the Mosaic Window Display.....	43
7.2	Manage Swaths.....	43
7.2.1	Swath Management and Playback Tutorial.....	44
7.3	Toggle Display Units.....	45
7.3.1	Display Units Tutorial .....	45
7.4	Apply Imagery Processing Options.....	46
7.4.1	Swath Properties .....	46
7.4.2	Trimming Tutorial.....	48
7.4.3	Rendering Tutorial .....	48
<b>8</b>	<b>WORK WITH CONTACTS.....</b>	<b>50</b>
8.1	Mark Contacts .....	51
8.2	Elements of the Contacts Window.....	51
8.2.1	Thumbnails List.....	52
8.2.2	Toolbar .....	53
8.2.3	Contact Display.....	53
8.2.4	Properties Table .....	53
8.2.5	Staging Table .....	54
8.2.6	Contact Display Commands.....	54
8.3	Attribute Contacts .....	56
8.3.1	Classify Contacts .....	56
8.3.1.1	Add Comments .....	56
8.3.1.2	Add Tags .....	56
8.3.2	Measure Contacts.....	57
8.3.3	Calculate Contact Height .....	57
8.3.4	Change Position .....	58
8.3.5	Rename Contacts.....	58
8.3.6	Contact Attribution Commands.....	58
8.4	Group Contacts .....	60
8.5	Export Contacts.....	61
8.5.1	Send contacts to the staging table.....	61
8.5.2	Prep the Staging Table .....	62
8.5.3	Export a Report .....	62
8.5.4	Delete Contacts .....	63
8.5.5	Contact Organization Commands .....	64
8.6	Contacts Tutorial.....	65
<b>9</b>	<b>ADDITIONAL FEATURES.....</b>	<b>67</b>
9.1	Export Tool .....	67
9.1.1	File Type.....	67
9.1.2	Extent.....	68
9.1.3	Resolution .....	68
9.1.4	Export Tutorial .....	68
<b>10</b>	<b>END ACQUISITION AND CLOSE PROJECT .....</b>	<b>69</b>

## Figures

Figure 1.	Install Dongle Drivers.....	4
Figure 2.	SAMM Launch Options.....	5
Figure 3.	Select Project Window.....	6

Figure 4. Graphical User Interface .....	7
Figure 5. Swath List.....	10
Figure 6. Forward Look Window .....	10
Figure 7. Live Info.....	11
Figure 8. Playback Controls.....	11
Figure 9. Sonar Controls.....	11
Figure 10. Configuration Window.....	13
Figure 11. Projection Subpanel.....	14
Figure 12. Survey Setup Subpanel .....	15
Figure 13. Display Subpanel.....	15
Figure 14. Recording Subpanel .....	16
Figure 15. Swath Colormap Panel .....	17
Figure 16. Crash Detection Prompt.....	18
Figure 17. Configuration Window for Demo Data .....	20
Figure 18. Empty Basic Chart Display Options Window.....	22
Figure 19. Select Overlay Type Error Message.....	23
Figure 20. ASCII Text Import Options .....	24
Figure 21. Charts Loaded in Basic Window, with Context Menu.....	24
Figure 22. Chart Display Options Window upon Launch.....	26
Figure 23. Add/Scan Charts Panel.....	27
Figure 24. Populated Chart Database .....	28
Figure 25. Charts Tab.....	29
Figure 26. Add Data Screen .....	33
Figure 27. GUI in Playback Mode .....	34
Figure 28. Navigation Interfacing .....	36
Figure 29. M3 Interfacing.....	37
Figure 30. ProViewer Data Streaming Configuration .....	38
Figure 31. BlueView Interfacing .....	38
Figure 32. Gemini Interfacing.....	39
Figure 33. Gemini Sonar Controls.....	40
Figure 34. Status Bar Position Units .....	45
Figure 35. Imagery Processing Options .....	46
Figure 36. Swath Properties Window .....	47
Figure 37. Brightness and Gamma Rendering Effects.....	49
Figure 38. Feathering Effect .....	49
Figure 39. Contacts in Mosaic Window .....	51
Figure 40. Contacts .....	52
Figure 42. Assigning Tags .....	57
Figure 41. Grouped Contacts and Context Menu .....	61
Figure 43. Filtering by Tag.....	62
Figure 44. Create Report Success Window.....	63
Figure 45. Export Dialog .....	67

## Tables

Table 1. System Requirements.....	3
Table 2. Create or Open Project .....	6
Table 3. Main Toolbar Icons .....	8
Table 4. Mosaic Toolbar .....	8
Table 5. View Toolbar.....	8
Table 6. Status bar .....	9
Table 7. Parameters and Units .....	16
Table 8. Change the Rendering Method .....	18

Table 9. Configure Project .....	19
Table 10. Load and Display Charts .....	31
Table 11. Chart Customization Commands .....	31
Table 12. Add Data .....	34
Table 13. Mosaic Window Extent Commands .....	43
Table 14. Swath Management Commands .....	44
Table 15. Contacts Toolbar Icons .....	53
Table 16. Contact Display Commands .....	54
Table 17. Contact Attribution Commands .....	58
Table 18. Contact Organization Commands .....	64

## Acronyms and Abbreviations

cm	centimeter
CPU	central processing unit
ENC	Electronic Navigational Chart
FLS	forward-looking sonar
GIS	geographic information system
GPU	graphics processing unit
GUI	graphical user interface
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
OIC	Oceanic Imaging Consultants, Inc.
PPI	plan position indicator
SMMM	Stand Alone Mosaicking Module
TIFF	Tagged-Image File Format
UTM	Universal Transverse Mercator

# 1 Welcome to SAMM

SAMM (Stand Alone Mosaicking Module) is Oceanic Imaging Consultants Inc.'s (OIC) software program for real-time mosaicking of underwater imagery from forward-looking sonar (FLS). SAMM automatically creates mosaics of your FLS data in real time over your co-registered charts or imagery while logging the raw data for playback and post-processing. While you are running your FLS or when you are back in the office, SAMM will show where you've been and what you saw.

This manual documents SAMM's features and functions. Information is presented in the order that you need it for out-of-the-box playback and then data acquisition. It discusses each process in the SAMM workflow and how to accomplish it. Selected sections conclude with a table of commands relevant to the workflow process described in that section, which serves as a review of the commands available in SAMM and how to execute them. Selected sections also include an interactive tutorial for demonstrating some of the features. Test data are provided with the software for use with the tutorial instructions. The sections are as follows:

- System Requirements and Setup
- The Graphical User Interface (GUI)
- Configure SAMM
- Load Charts
- Add Files or Begin Acquisition
- Display and Processing Settings
- Work with Contacts
- Additional Features
- End Acquisition and Close Project.

We use the following typographical rules throughout this manual for emphasis and clarity:

- **Boldface** indicates onscreen buttons, commands, fields, or icons from a toolbar, menu or window.
- `Courier New` indicates user input or SAMM output. This includes all of the text in the SAMM interface that your actions can change.
- Grey shading of text or columns in a table indicate specific tutorial instructions. Follow these directions to check your work against the figures in this manual.
- Key names are written as they appear on the keyboard. Key combinations are indicated with a plus sign between them, e.g., to press Alt+F, press Alt and F simultaneously.
- Click means to press the left mouse button. Double-click means to quickly press the left mouse button twice. Right-click means to press the right mouse button.

For further assistance using the SAMM program, we encourage you to contact us.

**Phone:** 1+(808) 539-3706  
**Fax:** 1+(808) 791-4075  
**Email:** [support@oicinc.com](mailto:support@oicinc.com)  
**Web:** [www.oicinc.com](http://www.oicinc.com)

This page is intentionally left blank.



## 2 System Requirements and Setup

This section describes the sensor and system requirements for computers hosting SAMM, and how to install, launch, and create/open a project in the software.

### 2.1 Sensor and Input Requirements

SAMM is seamlessly compatible with Kongsberg Mesotech M3, Teledyne BlueView, and Tritech Gemini 720i and 720id multibeam imaging sonar systems. SAMM requires absolute position (longitude/latitude) input in GPS coordinates on the WGS 1984 datum and heading metadata input. Your GPS receiver must be set to the WGS 1984 reference datum.

SAMM does not interface directly with the M3 and BlueView sonars. Rather, it interfaces with the M3 software and ProViewer™, Teledyne's software designed to control all BlueView model sonars. ProViewer Version 4.0.7410 or later is required (please contact your BlueView sales representative for updates). SAMM interfaces directly with the Tritech Gemini 720 series sonars, and requires that:

- the Gemini software not be run concurrently with SAMM; and
- navigation and heading sensors or GreenSea navigation are available for direct interface. *(At this time, the option to interface directly with the navigation and heading sensors or GreenSea are not yet available for M3 and BlueView owners.)*

### 2.2 System Requirements

SAMM is a Windows-based application. *While SAMM will be compatible with Windows XP through Windows 8.1 in the future, this version has only been thoroughly tested with Windows 7.* The minimum system requirements and recommended specifications are presented in Table 1.

**Table 1. System Requirements**

Component	Minimum	Recommended
Processor	Dual core	Quad core
RAM	2 GB	4 GB
Graphics	CPU	OpenGL 3.0+ compatible GPU and up-to-date video driver
Display	1024x758 (32 bit color)	
Disk Space	Install is approximately 200MB, but more space is needed for logging data. Please be aware that some systems may log close to 1 GB/min.	
Drives	CD-ROM drive for installation	
Ports	USB port for dongle; Gemini owners, Ethernet port for sonar connection and serial port(s) if using NMEA inputs	

The computer that is running SAMM does not require a dedicated graphics processing unit (GPU), but a GPU does provide better performance. SAMM will automatically offload computation-intensive tasks such as mosaicking and high-quality rendering to the GPU when the GPU supports OpenGL 3.0+. In practice, most recent Intel central processing units (CPU) come with an integrated GPU that meets this requirement, as well as most recent mobile/desktop GPUs from AMD/NVIDIA. You must keep your video driver updated, however.

To ensure that you have the most updated driver for your system, please go to the manufacturer's Web site:

For AMD/ATI:

<http://support.amd.com/en-us/download>

For NVIDIA:

<http://www.nvidia.com/Download/index.aspx>

For Intel HD 3000/4000/5000 series:

<https://downloadcenter.intel.com/>

In order to run the SAMM software, an OIC-provided dongle must be attached to the workstation, with up-to-date dongle drivers installed. Dongle drivers are present in the installation media provided by OIC (see Section 2.3).

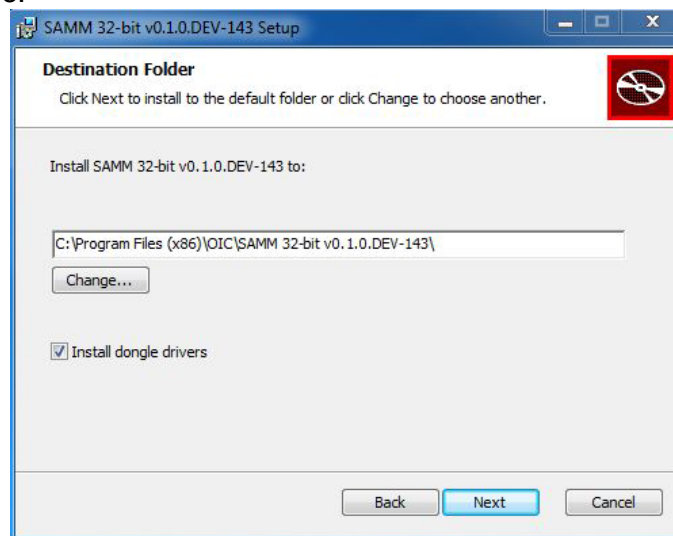
## 2.3 Install SAMM

SAMM installs by default to an OIC folder in the Program Files on the local drive. The installation package comes with a dongle, which looks like a USB stick, and a disc including three folders: demo\_data, documentation, and install. The demo\_data folder contains charts, a demo project, and demo data files in the native SAMM format. The documentation folder contains the playback tutorial, acquisition tutorial, and this user manual. The install folder contains the installation file.

If you have a limited feature demonstration version, the demo\_data folder may contain additional folders for different sensor data. The sensor data files cover the same targets in our home marina. The limited feature version only plays encrypted data files, does not need a dongle to run, and cannot acquire data.

To install SAMM:

1. Put the disc in your disc drive and navigate to the install folder.
2. Double-click on SAMM32-0.1.0.DEV-XXX.msi (file name is not exact).
3. Follow the onscreen installation wizard instructions to complete the installation. On the screen pictured in Figure 1, enable dongle driver installation by clicking the checkbox, as shown in the figure.



**Figure 1. Install Dongle Drivers**

4. Create a folder on your local (C:) drive named SAMM\_DEMO, for continuity with OIC training materials.
5. Copy the demo\_data folder to the SAMM\_DEMO folder. SAMM performs better when data are saved locally.
6. Insert the OIC dongle into a USB port.

## 2.4 Launch SAMM

SAMM launches using standard Window commands, except for the dongle. The dongle must be in a USB port or you will receive an error message. After securing the dongle, either:

- double-click on the **SAMM** desktop icon;
- from Windows Explorer, navigate to the install folder in the Program Files folder, and double-click on the SAMM.exe; or
- click on the **Start** Windows icon, click on the Oceanic Imaging Consultants folder in All Programs, then click on the program folder, and finally click on SAMM.

From the **Start** menu, you have the option to launch SAMM regularly or with hardware or software rendering (Figure 2). SAMM auto detects the available hardware with a regular launch to determine the rendering method. The hardware or software rendering launch options are available to override this auto detect function. Please see Section 4.6 for more information regarding the rendering method.

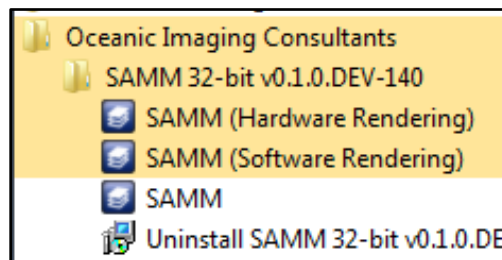


Figure 2. SAMM Launch Options

If SAMM has detected multiple crashes, it may present you with the option of switching to software mode upon launch. You might find it beneficial to test if SAMM performs better in software mode on your system. SAMM also presents you with the option of sending a crash detection report if the software crashes. Please fill out this report if you would like our developers to investigate the cause of your crash.

## 2.5 Create or Open a Project

A SAMM project is a working directory that stores files for the program such as contacts, cached files, and processed swath and mosaic data. The project folder contains results obtained from mosaicking the project data, including swath files and exported mosaic data (you may choose to save exports elsewhere).

The project folder is stored in the workspace, or working directory. For continuity with OIC training materials, we suggest that you use the SAMM\_DEMO folder that you copied the data to earlier. The default directory is <my documents>\samm\_projects, which works just as well. If you do not choose one of these locations, choose another location, but not one in which you have installed SAMM executables (i.e., other than C:\Program Files\OIC).

Upon launching OIC's SAMM, choose between creating a new project or opening an existing project in the select project window (Figure 3).



Figure 3. Select Project Window

Follow the instructions in Table 2 to create a new project or open an existing project.

Table 2. Create or Open Project

To create a new project:	To open an existing project:	To open a recent existing project:
<ol style="list-style-type: none"> <li>1. Click <b>Workspace</b> to open the Select Folder window.</li> <li>2. Enter a name in the <b>New project</b> field: <i>Test</i>.</li> <li>3. Change the workspace to C:\SAMM_DEMO</li> <li>4. Click <b>Create</b>. SAMM's GUI displays.</li> </ol>	<ol style="list-style-type: none"> <li>1. Click <b>Open</b> to open the Open window.</li> <li>2. Navigate to the location where the project is saved (C:\SAMM_DEMO\demo_data\Gemini_HawaiiKai).</li> <li>3. Click the geomosaic.xml file to select it.</li> <li>4. Click <b>Open</b>. SAMM's GUI displays.</li> </ol>	<ol style="list-style-type: none"> <li>1. Click <b>Recent</b>.</li> <li>2. Click the project name. SAMM's GUI displays.</li> </ol> <p>OR</p> <ol style="list-style-type: none"> <li>1. Enter the name of the project in the <b>New project</b> field.</li> <li>2. Click <b>click to open</b>. SAMM's GUI displays.</li> </ol>

### 3 The Graphical User Interface

Before viewing and acquiring data, take a moment to familiarize yourself with the GUI (Figure 4). The SAMM interface has three toolbars, a mosaic window, a status bar, and ancillary windows with controls. Some elements are specific to the acquisition, playback, or data processing modes. Each element of the GUI is described in the section.

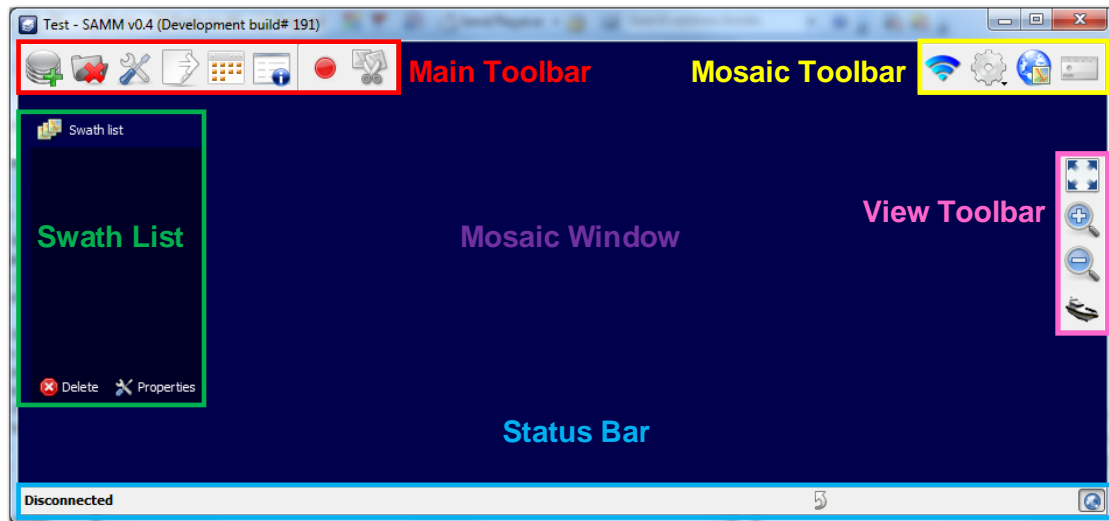


Figure 4. Graphical User Interface

#### 3.1 Mosaic Window

The multilayer interactive mosaic window shows a geocoded graphic of the FLS data. SAMM layers processed sonar data over a background (navigational chart or aerial imagery) as raw data are collected or loaded. Sections of the survey track that have been processed from the raw data are referred to as swaths. All of the swaths from a survey are referred to as the mosaic, or the processed dataset. The procedure of drawing the swaths in the mosaic window is called mosaicking the swaths. SAMM only logs or records data when in acquisition mode, not in playback mode, but mosaics swaths in both acquisition and playback mode.









In playback and acquisition mode, a green outlined polygon represents the vessel and section of the plan position indicator (PPI) being mosaicked. The PPI is a pie-shaped flashlight view of the sonar data, also found in the Forward Look window. Pink outlined crosshairs represent the positions of the GPS antenna and the sonar head.

- To see the vessel, PPI, and nav and sonar head positions, zoom out by rolling your mouse wheel toward you, clicking the **Zoom out** icon on the right side of the screen, pressing the - key, or using a two finger scroll away from you on a laptop track pad.

#### 3.2 Main Toolbar

The main toolbar is a collection of icons that open dialog boxes or directly execute commands when clicked. The main toolbar icons are pictured and described in Table 3, in the order that they appear from left to right on the toolbar.





**Table 3. Main Toolbar Icons**

Icon	Icon Name	Function
	Add data	Open Add Data window
	Close project	Close the current project
	Configuration	Open Configuration window
	Export	Open Export Data window
	Contacts	Open Contacts window
	Properties	Open sonar head Properties window (only available in playback/acquisition mode for Gemini)
	Record toggle	Begin or end raw data recording to file in acquisition mode or mosaicking in playback mode
	Manually start a new swath	Break raw data recording or mosaicking without pause

### 3.3 Mosaic Toolbar

The mosaic toolbar is a collection of icons that open dialog boxes or directly execute commands in the mosaic window. The icons are pictured and described in Table 4, in the order that they appear from left to right on the toolbar.

**Table 4. Mosaic Toolbar**





Icon	Icon Name	Function
	Display the forward look window	Open the Forward Look window
	Display options	Drop down the swath display options window
	Chart background options	Open the Chart Display Options dialog box
	Measure tool (not yet available)	Open the measure tool <i>(not yet available)</i>

### 3.4 View Toolbar

The view toolbar is a collection of icons that affect the mosaic window extent and behavior when clicked. The icons are pictured and described in Table 5, in the order that they appear from top to bottom in the toolbar.

**Table 5. View Toolbar**

Icon	Icon Name	Function
------	-----------	----------

Icon	Icon Name	Function
	Reset the view to the entire survey	Reset the mosaic view to the entire survey
	Zoom in	Zoom in to the center of the mosaic window
	Zoom out	Zoom out from the center of the mosaic window
	Auto adjust the display to follow the sensor	Automatically center the mosaic view on the sensor

### 3.5 Status Bar

The status bar is located at the bottom of the main window. It displays operational mode and sensor status; reports errors and the position of the mouse cursor in the mosaic window; and hosts several buttons. The definition for each status bar element is supplied in Table 6, in the order that they appear from left to right on the status bar.

**Table 6. Status bar**











Icon/Output	Definition	Mode
<b>Disconnected</b>	Sonar not connected / Data not loaded for playback	Acquisition, Playback and Post-processing
<b>RECORDING</b>	Logging data and mosaicking swaths	Acquisition
<b>LIVE</b>	Not logging data/Not mosaicking swath	Acquisition
<b>Playback</b>	Playback mode active	Playback
 1.9 KB/s  1.8 MB/s	Sensors connected	Acquisition
 0.0 B/s  0.0 B/s	Sensors not connected	Acquisition
	An error occurred	All
	Button to review error reporting window	All
	Button to cancel file acquisition/playback/loading	All
 M\koko-marina-gemini\data.1385510330801_004.msk 8.9 MB/s	File acquisition/playback/loading progress	All
N21°16'44.285" W157°42'18.158" 	Position of cursor in mosaic window in GPS coordinates, and toggle	All



Table 6. Status bar

Icon/Output	Definition	Mode
	button	
x: 634335.02 m    y: 2353571.31 m 	Position of cursor in mosaic window in UTM coordinates, and toggle button	All

### 3.6 Swath List



Figure 5. Swath List

The swath list appears by default to the left of the SAMM mosaic window; it lists the swaths in the project (Figure 5). As the survey or playback progresses, SAMM lists swaths by name in this list and paints them in the mosaic window. Section 7.2 describes how to use this list to manage swaths.

- To hide the Swath list, click the **Swath list** button.

### 3.7 Forward Look Window

The Forward Look window shows the PPI, or a flashlight view of the FLS data in a pie-shaped window (Figure 6). Numbers on the arc side of the PPI mark the angle in degrees from the direction the sonar head is pointed up to the sonar head's field of view. The numbers on the radial sides mark the range in meters from the sonar head. Use this window to mark targets, or contacts, in the PPI and monitor your image quality.

- If you close the Forward Look window, reopen it by clicking on the **Display the forward look window** icon in the mosaic toolbar.

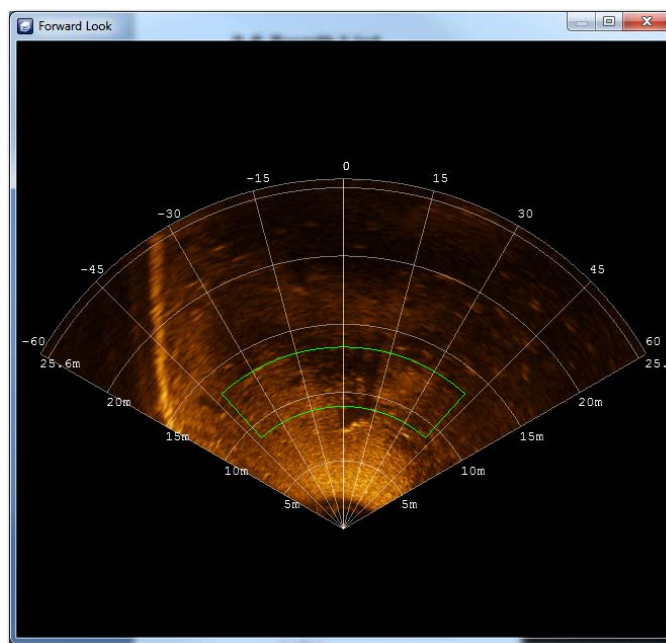


Figure 6. Forward Look Window



### 3.8 Live Info

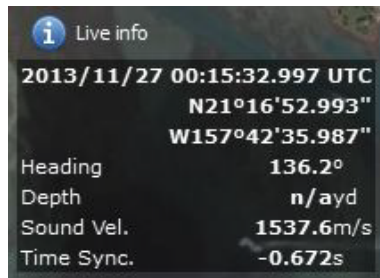


Figure 7. Live Info

The Live info widget displays continuously updated values for time, position, heading, and if available, depth, sound velocity, and time synchronization (a real-time estimation of navigation latency). These metadata appear on the left side of the GUI in playback and acquisition mode (Figure 7). SAMM retrieves these metadata feeds from the sonar software or navigation/heading sources (depending on your survey setup). Time synchronization is computed by SAMM.

- To hide the metadata, click the **Live info** icon.

### 3.9 Playback Controls

Playback controls appear on the left side of the GUI in playback mode. The playback controls include a start/pause button (*the Next button is unavailable at this time*) and a slider bar to speed up or slow down playback (Figure 8). Playback of \*.son (ProViewer) files includes a Sound Velocity input box.

- To hide the controls, click the **Playback controls** icon.

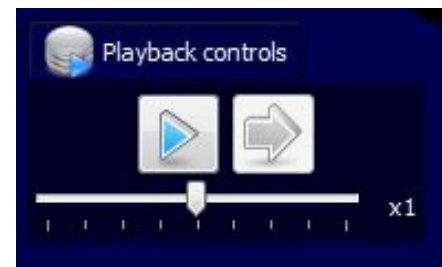


Figure 8. Playback Controls

### 3.10 Sonar Controls

Sonar controls appear on the left side of the GUI in acquisition mode, if needed. For the M3 and BlueView/ProViewer users, sonar controls are implemented directly in the native software. Tritech Gemini requires no native software, so SAMM offers range, gain, sound velocity controls and an auto ping mode disabler. These controls do affect the raw data.

- To hide the sonar controls, click the **Sonar controls** icon.

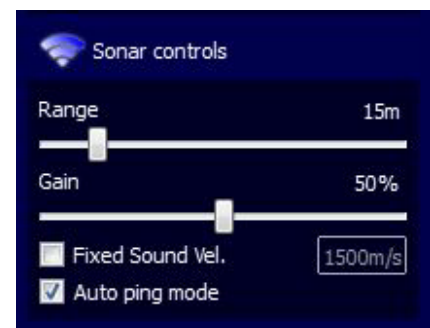


Figure 9. Sonar Controls

This page is intentionally left blank.

## 4 Configure SAMM

Before loading or acquiring data in a SAMM project, the user should set up the project in the Configuration window, accessed from the **Configuration** icon on the main toolbar (Figure 10). The user has the option to enter survey offsets and change the projected coordinate system, units of measure, file breaking method, and/or rendering method. All of the options are saved as application settings. This section describes each subpanel of the Configuration window, from top to bottom, and provides a tutorial.

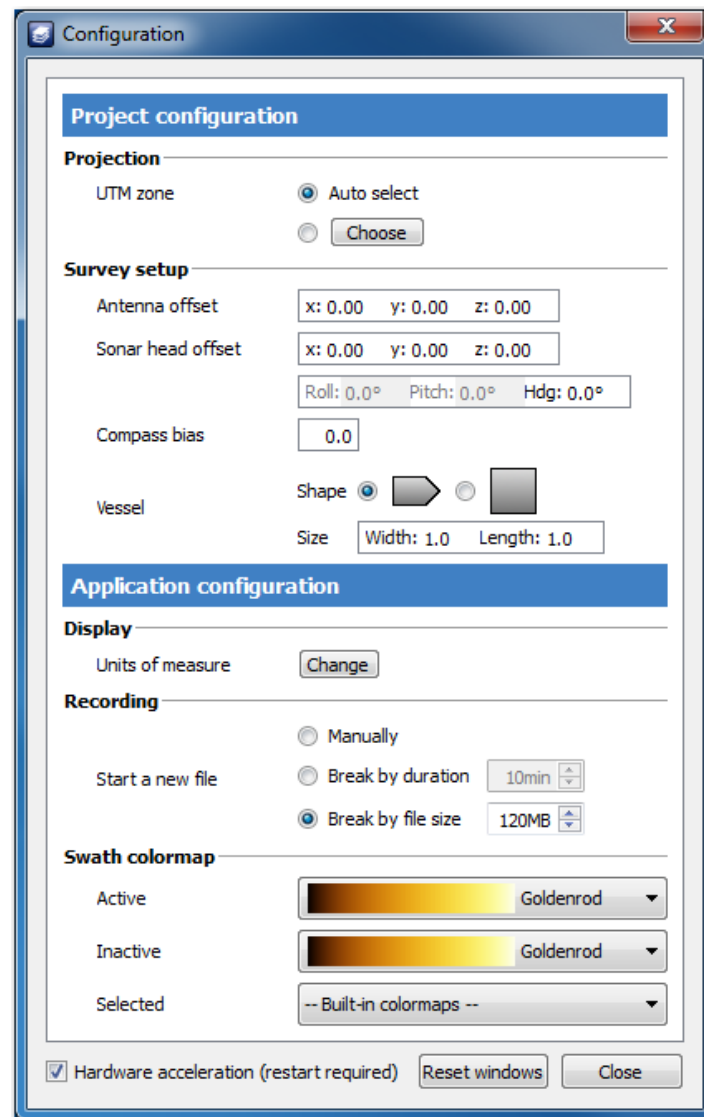


Figure 10. Configuration Window

## 4.1 Projected Coordinate System

The projection for the mosaic display and exported mosaic images can be set in the Projection subpanel of the Configuration window, before data are added to the project through acquisition, playback, or file loading (Figure 11).

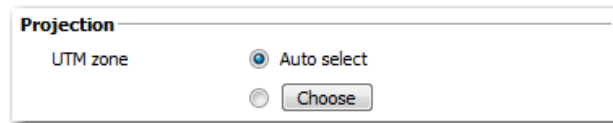


Figure 11. Projection Subpanel

SAMM recognizes navigation input as GPS coordinates on the WGS 1984 datum only. By default, SAMM projects the GPS navigation input to Universal Transverse Mercator (UTM) zones (WGS84 datum as well), performs calculations in UTM meters, and then projects the background charts to the UTM zone to produce the aligned map.

UTM zones cover six degrees of longitude, run from 80° S to 80° N, are numbered from 1 to 60, and are lettered N or S according to the northern or southern hemisphere. Zone numbering starts at -180 degrees longitude (Midway Island, and the International Dateline) and increase to the east. Hawai'i, for example, is mostly in Zone 4, while the US East Coast is around Zone 18, and the United Kingdom is Zone 30, at Greenwich.

The following projected coordinate systems are also supported in SAMM: Australian Coordinate System, British National Grid, Japanese Coordinate System, Geodetic (lon/lat WGS 1984), Mercator (Equator), New Zealand Coordinate System, and the U.S. State Plane Coordinate System (NAD27 and NAD83). The UTM zones are also available on the NAD27 and NAD83 datums. If you would like to use a projection that is not supported, please contact OIC.

SAMM will project the sonar image and background charts on-the-fly to the coordinate system set in the Configuration window. You may only set the projection **before** data are added or acquisition begins. Please keep this in mind when creating projects. To manually change the mosaic display projection from the default UTM WGS84:

1. Click the **Configuration** icon.
2. In the Projection subpanel, choose the coordinate system by clicking on one in the **Choose** dropdown menu.
3. Click outside of the **Choose** menu to hide the menu.
4. Click **Close**.

As soon as data acquisition begins, the projection and UTM zone are locked for that project. If you would like to use a different projection or zone, please create a new project.

## 4.2 Sensor Offsets

Unless the FLS is co-located with the navigation and heading sources, SAMM must approximate the actual sensor position in order to produce the sonar image and mosaic. The Survey setup subpanel of the Configuration window provides input fields for the vessel dimensions and translational and rotational offsets associated with the sonar, navigation, and heading sensors (Figure 12).

Figure 12. Survey Setup Subpanel

The fields are defined as follows.

- Antenna offset: the distance of the GPS receiver antenna from a reference point in common with the sonar head offset. The numbering convention is:  
X = Port / Starboard (positive number = starboard, negative number = port).  
Y = Fore / Aft (positive number = fore, negative number = aft).  
Z = Height (positive number = above reference point, negative number = below reference point).
- Sonar head offset: the distance of the sonar head from a reference point in common with the antenna offset. The same numbering convention is used as for the antenna offset.
- Sonar heading offset: the sonar mount bias, i.e., the angular difference between the centerline of the boat and the actual pointing direction of the sonar.
- Pitch and roll offsets: *The pitch and roll offsets are not relevant to 2D imaging sonar, and as such are not yet available.*
- Compass bias: the heading source mount bias, i.e. the difference between the reported pointing direction of the heading source and the actual pointing direction of the heading source. If you have a magnetic compass and know the declination (the difference between north and magnetic north) for the survey, add it to this bias field. (*Automatic magnetic declination based on lon/lat is not available at this time.*)
- Vessel: the shape, width, and length of your vessel. These fields define how the vessel outline is drawn in the mosaic window.

SAMM draws the vessel, GPS antenna and sonar head in the mosaic window in reference to the center of the boat. Please note that the antenna and sonar head crosshairs will be incorrectly placed in relation to the vessel outline if you choose to use the location of either the GPS unit or the sonar head as the reference point. The mosaic is otherwise unaffected. The unit of measure for the x, y, and z offsets must match the unit for distance and vertical distance in the Display subpanel of the Configuration window (see Section 4.3).

### 4.3 Display Units

Display units may be changed from the Display subpanel of the Configuration window (Figure 13).

Figure 13. Display Subpanel

Table 7 shows the parameter, available units, and affected display area.

Table 7. Parameters and Units

Value	Units	Affected Display Area
<b>Easting/Northing</b>	Meters Feet Yards	Status bar
<b>Longitude/Latitude</b>	Degree minute seconds Degree decimal minutes Decimal degrees	Live Info Status bar Contacts
<b>Distance</b>	Meters Feet Yards	Contacts Measure Tool <i>(not yet available)</i> Survey Setup subpanel of Configuration window
<b>Vertical Distance (depth/altitude)</b>	Meters Feet Yards Fathoms	Live Info Contacts
<b>Speed over ground</b>	Meters per second Feet per second Knots	<i>(Not yet implemented)</i>
<b>Speed of sound</b>	Meters per second Feet per second	Live info
<b>Temperature</b>	Degrees Celsius Degrees Fahrenheit Kelvin	Properties

To change the units of measure:

1. Click the **Configuration** icon.
2. In the Display subpanel, click **Change**.
3. For any field, click the dropdown menu and click the desired unit.
4. Click outside of the **Change** menu to hide the menu.
5. Click **Close**.

## 4.4 File Size

SAMM provides three methods for creating a new file during data acquisition: manually, break by duration, and break by file size (Figure 14).

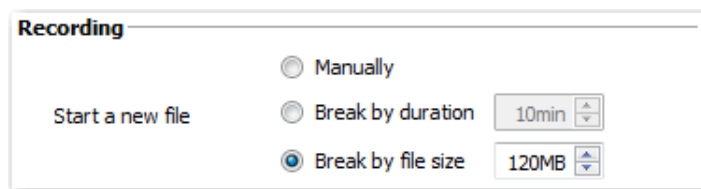


Figure 14. Recording Subpanel

SAMM's default file break method is to break by file size when the size reaches 120 MB.

To change the file break method:

1. Click the **Configuration** icon.

2. In the Recording subpanel, click the radio button corresponding to the desired method.
3. Click **Close**.

When breaking manually, the user must click the **Manually start a new swath** icon to break the file. Raw data rates from modern sensors can easily exceed 100KB/sec. While workstations, media, and operating systems can handle large file sizes, please consider your workflow, memory, and file transfer limitations before deciding to break files manually. Please also consider that data loss due to corruption is significantly more catastrophic for single large files than single small files.

SAMM automatically names files by combining the time the file was created with an incremental number.

## 4.5 Swath Colormap

The Swath colormap panel of the Configuration window enables the user to change the swath display colors of active, inactive, and selected swaths (Figure 15). During processing, SAMM displays imagery data in the mosaic window and PPI by matching pixel values to screen colors using the colormap. Changing the colormap may highlight different objects in the subsea environment.

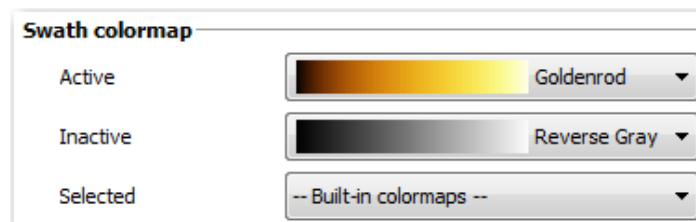


Figure 15. Swath Colormap Panel

The active swath refers to the swath that SAMM is currently mosaicking. Inactive swaths are those swaths that are completely mosaicked. Selected swaths (*not yet available*) are swaths highlighted in the Swath list. SAMM has nine built-in colormaps: goldenrod, copper, reverse gray, grayscale, bone, cool, green, hot, and jet (rainbow). Each colormap brings out different features of the data.

To change the colormap for swaths:

1. Click the **Configuration** icon.
2. In the Swath colormap panel, click the dropdown menu for the swath type and click the desired colormap.
3. Click **Close**.

## 4.6 Rendering Method

SAMM either uses software or hardware to render swaths and perform computations. Which method used depends on your available hardware, which SAMM auto detects. SAMM uses hardware rendering if you have a GPU, either integrated in the CPU or video card. SAMM's mosaic window and PPI have higher quality images when using a GPU to render the sonar data. If you do not have a GPU, SAMM uses software rendering. If SAMM detects multiple crashes, it will automatically ask if you want to switch to software rendering upon launch (Figure 16).

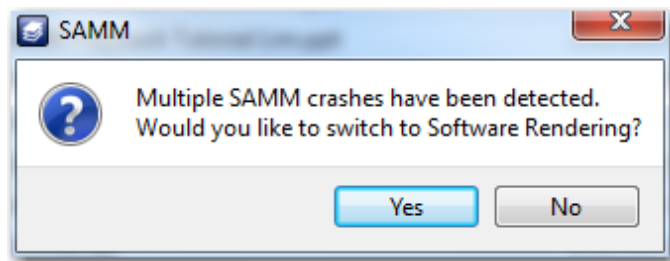


Figure 16. Crash Detection Prompt

Table 8 describes the three ways to change between software and hardware rendering, if you desire to override SAMM's detected method.

Table 8. Change the Rendering Method

After launching SAMM:	From launch:	Upon the launch prompt:
<ol style="list-style-type: none"> <li>1. Click the <b>Configuration</b> icon in the main toolbar.</li> <li>2. Check/uncheck the <b>Hardware Acceleration</b> box.</li> <li>3. Click <b>Close</b>.</li> <li>4. Click the <b>Close</b> icon to close the project.</li> <li>5. Click the <b>Close</b> button on the project selector screen to close SAMM.</li> <li>6. Relaunch SAMM.</li> <li>7. Reopen the project.</li> </ol>	<ol style="list-style-type: none"> <li>1. Click on the <b>Start Windows</b> icon.</li> <li>2. In the All Programs menu, click on the Oceanic Imaging Consultants folder.</li> <li>3. In the SAMM program folder, click on <b>SAMM (Hardware Rendering)</b> or <b>SAMM (Software Rendering)</b>.</li> </ol>	<ol style="list-style-type: none"> <li>1. Click <b>Yes</b> or <b>No</b> to switch to software rendering or keep hardware rendering, respectively.</li> </ol>

## 4.7 Reset Windows Button

SAMM remembers the last location of its windows between sessions. The **Reset windows** button restores the windows to their defaults locations. After clicking the button, you must close the project and then exit SAMM. Relaunch SAMM, and then the windows will be restored to their default location. The Forward Look window opens in front of the mosaic window.



## 4.8 Configuration Tutorial

Table 9 provides instructions for configuring a project using the demo data and for data acquisition.

**Table 9. Configure Project**

To configure for playback mode with demo data:	To configure for data acquisition:
<ol style="list-style-type: none"> <li>1. Click the <b>Configuration</b> icon.</li> <li>2. In the projection subpanel, leave the UTM zone set to <b>Auto select</b>.</li> <li>3. In the Display subpanel, click on <b>Change</b> and visually confirm the <b>Distance</b> and <b>Vertical distance (depth/altitude)</b> fields are set to <b>Meters (m)</b>.</li> <li>4. In the Survey setup panel: <ul style="list-style-type: none"> <li>• in the <b>Antenna offset</b> field, enter x:0.00 y: 0.00 z:0.00;</li> <li>• in the <b>Sonar head offset</b> field, enter x: 1.97 y:-3.35 z: -1.00;</li> <li>• leave the <b>Hdg</b> field set at 0.0;</li> <li>• leave the <b>Compass bias</b> field set at 0.0;</li> <li>• do not change the boat shape; and</li> <li>• in the <b>Size</b> field, enter Width: 3.0 and Length: 8.0.</li> </ul> </li> <li>5. The Recording subpanel is not applicable in playback mode. Do not change the setting.</li> <li>6. In the Swath colormap panel, <ul style="list-style-type: none"> <li>• leave the <b>Active</b> field set to Goldenrod;</li> <li>• leave the <b>Inactive</b> field set to Goldenrod; and</li> <li>• leave the <b>Selected</b> field undefined.</li> </ul> </li> <li>7. Check that your Configuration window matches Figure 17.</li> </ol>	<ol style="list-style-type: none"> <li>1. Measure your sensor offsets and look up the declination for your survey, if desired.</li> <li>2. Click the <b>Configuration</b> icon.</li> <li>3. In the Projection subpanel, choose the desired projection for the mosaic display window.</li> <li>4. In the Display subpanel, set the distance and vertical distance units to the unit of your measured antenna and sonar offsets. Click <b>Change</b> and then click the desired units on the dropdown menus.</li> <li>5. In the Survey Setup panel: <ul style="list-style-type: none"> <li>• in the <b>Antenna offset</b> field, enter the distance of the antenna from the reference point in the unit set in the configuration window;</li> <li>• in the <b>Sonar head offset</b> field, enter the distance of the sonar head from the same reference point using the same numbering convention;</li> <li>• in the <b>Hdg</b> field, enter the heading bias in degrees;</li> <li>• in the <b>Compass bias</b> field, enter the heading mount bias plus the declination of your survey location in degrees;</li> <li>• choose your vessel shape; and</li> <li>• in the <b>Size</b> field, enter the length and width of the boat in the unit set in the configuration window.</li> </ul> </li> <li>6. In the Recording subpanel, choose the desired method by which to break raw data files.</li> <li>7. In the Swath colormap panel, choose the desired colormap for active, inactive, and selected swaths.</li> </ol>

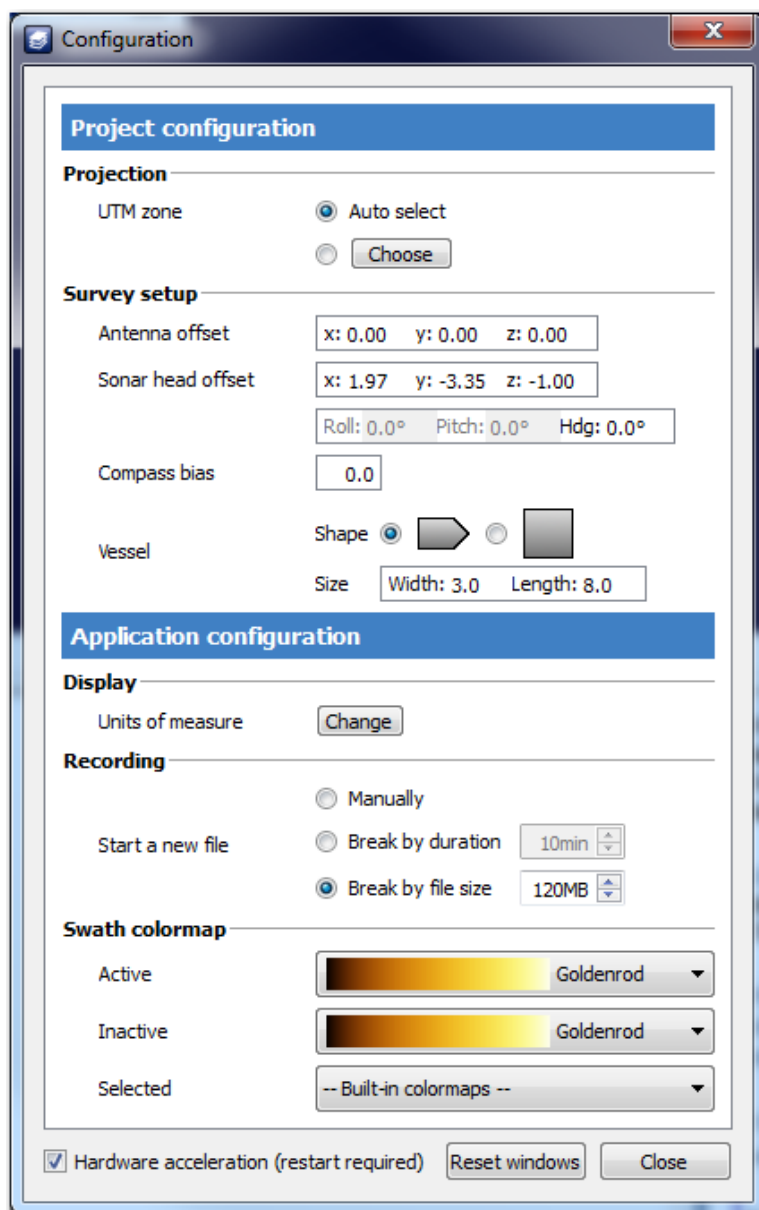


Figure 17. Configuration Window for Demo Data

## 5 Load Charts

SAMM's robust chart module enables you to load many different types of charts and geospatial data files as background layers in the mosaic window. The Chart Display Options window interfaces to the chart module, which is integrated with Global Mapper™ software.

This section describes the differences between the basic and advanced interface in the charts module; the differences between raster and vector data formats; how to retrieve National Oceanic and Atmospheric Administration (NOAA) Electronic Navigational Charts® (ENCs); the elements of the basic Chart Display Options window; the elements of the advanced Chart Display Options window; a tutorial on how to load charts to the advanced interface; and concludes with a table of commands for customizing the chart display.

### 5.1 Basic vs. Advanced Interface

The Chart Display Options window has a standard and advanced interface. In the basic interface, charts are added by file to the project only. This manual loading method is also available in the advanced interface. The chart module saves manually loaded files to the project, not to the application. In the advanced interface, users have the additional capability to add charts by folder to the charts database, which are saved to the application. Files added by folder are then available in any SAMM project. Both interfaces have the option of displaying the ArcGIS Web Mapping Service World Imagery basemap underneath locally added files. An Internet connection must be available for this option.

*Please note that at this time files loaded into a SAMM project display in the mosaic window after data have been loaded or acquisition has begun.*

### 5.2 Raster vs. Vector File Types

Geospatial data are stored as two types: raster or vector. Vector files have data stored in the files as features, i.e. as points, lines, polygons, and/or text. These features resize in SAMM when the mosaic window resolution is changed. Some common vector file types include NOAA ENCs (S-57 format), National Geospatial-Intelligence Agency Digital Nautical Charts® (VPF format), and ESRI shapefiles. Raster files, including NOAA Raster Navigational Charts® (BSB format) and GeoTIFFs, are image files with data stored as a grid of pixels. The text and other features are static, regardless of the zoom level.

While Global Mapper supports rendering many different types of files, SAMM has only been thoroughly tested with standard navigational chart types, shapefiles, and GeoTIFFs.

### 5.3 Retrieve NOAA Electronic Navigational Charts

If you do not have any nautical charts, follow these brief instructions to retrieve NOAA ENCs for your state. Web sites do change, so we cannot guarantee that these instructions are current. Skip to section 5.4 if you already have charts.

1. Go to the [NOAA Office of Coast Survey Chart Downloader](http://www.charts.noaa.gov/?Disclaimer=noaa%21nos%40ocs%23mcd&Submit=Proceed+to+Chart+Downloader) Web site (<http://www.charts.noaa.gov/?Disclaimer=noaa%21nos%40ocs%23mcd&Submit=Proceed+to+Chart+Downloader>).
2. Next to the second picture, click on the [ENCs](#) link.
3. Click on your state in the **ENCs by State** table.

4. Read the User's Agreement. Click **OK**.
  - The charts automatically download to your browser's default download folder.
5. Open the folder containing the charts.
6. Right-click on the charts folder ([State initials]\_ENCs.zip) and select **Extract All**.
7. Click **Browse**.
8. Navigate to a local disk or network drive to save the folder. Be sure to note the location where you save the file so that you can find it in the next step. (This is the location of your chart database that you will point to in SAMM in the next section.)
9. Click **OK**.
10. Click **Extract**.

NOAA updates charts nationwide weekly via a notice to mariners. If you are using your charts for navigational purposes, make sure to get new charts or check for updates.

## 5.4 Elements of the Basic Chart Display Options Window

The basic chart display options window, launched by clicking the **Chart background options** icon in the mosaic toolbar, hosts the chart database list and several buttons. Figure 18 shows an empty chart database list in the basic window. The basic chart loader saves information on a per-project basis.

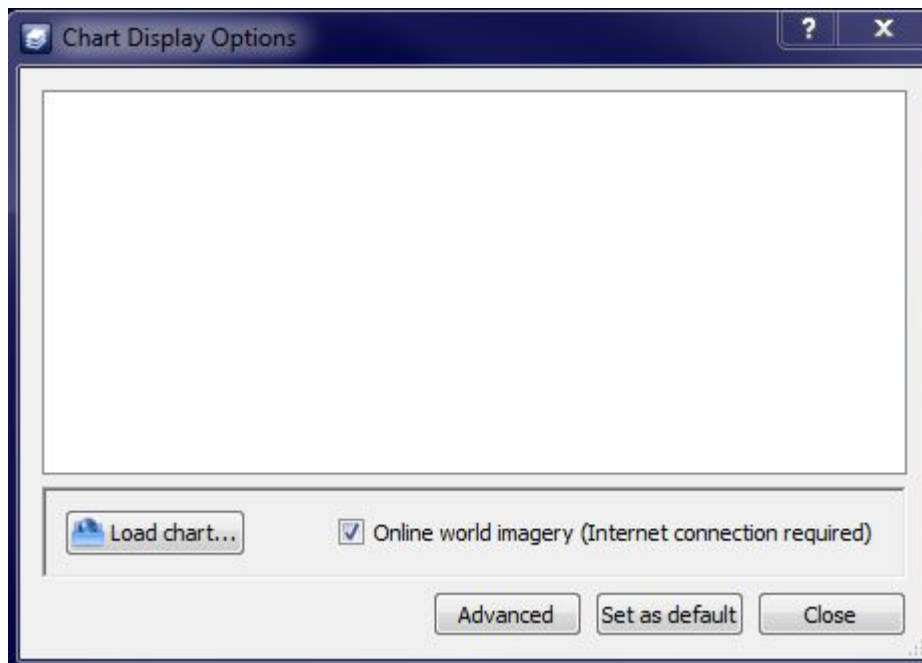


Figure 18. Empty Basic Chart Display Options Window

The basic chart display options window has a **Load chart...** button to load charts to the mosaic window, and provides the option to add the ArcGIS World Imagery basemap with an on/off checkbox. The **Advanced** button changes the chart display to the advanced interface, the **Set as default** button saves the current settings as the automatic chart display options to the application, and the **Close** button closes the Chart Display Options window. The next time the window is called, it will open to the last interface viewed. To load charts or other geospatial data files to the chart database list:

1. Click the **Load chart...** button.
2. In the Manual Load Chart window, navigate to the file location of your saved charts (C:\SAMM\_DEMO\demo\_data\charts).
3. Click on a file to select it (you may select multiple files).
4. Click **Open**.

#### 5.4.1 Basic Chart Display Popup Windows

The Manual Load Chart window enables you to select any file type present in the folder you are viewing. This is because Global Mapper supports many different file formats. Geospatial data are often stored in more than one file. If you select a support file, not the file that SAMM renders, you will be prompted to select the file format, as shown in Figure 19. This window appears whenever Global Mapper cannot tell what file type you have attempted to load.

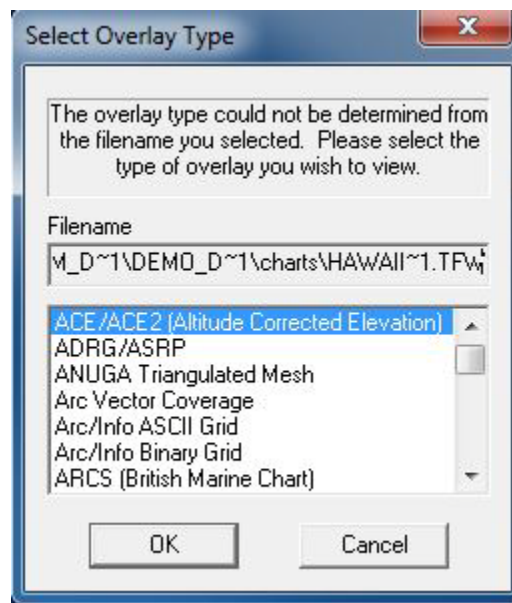


Figure 19. Select Overlay Type Error Message

If this window appears, you likely picked the wrong file type from a family of files sharing the same name, but with different file extensions. If you know you picked the correct file, then you can pick the file type from the list and click OK. If you are not sure,

1. Click **Cancel**.
2. In the chart database list, right-click on the orange Loading... file and click **Unload**.
3. Click the **Load chart...** button again.
4. Select all files of the same name in the family and click **Open**. SAMM will load the correct one, and try to load the incorrect ones.
5. You may get the Select Overlay Type window again for the support files. Click **Cancel**.
6. Give SAMM a moment to load the correct file (watch for one to turn green. The description will match the correct file).
7. Select all of the orange Loading...files (these will be the incorrect files from the family), right-click and click **Unload**.

If you choose to load a text file, you will be presented with the Generic ASCII Text File Import Options window (Figure 20).

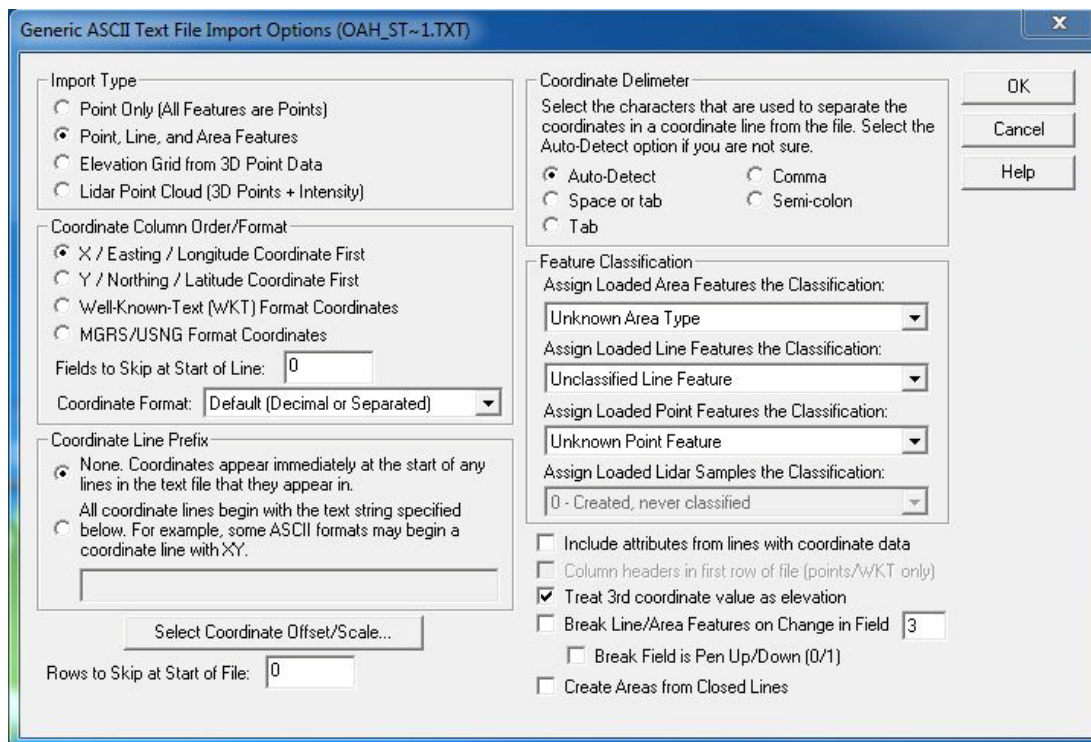


Figure 20. ASCII Text Import Options

If you accidentally loaded the text file, click **Cancel**, then unload the orange Loading... file in the chart database. If you intentionally loaded the text file, specify the format of the text file using the fields in the window. SAMM will render two-dimensional point or point, line, and area files.

#### 5.4.2 Using the Basic Chart Loader

Figure 21 shows the sample charts (ENC, RNC, air photo) loaded in the charts database.

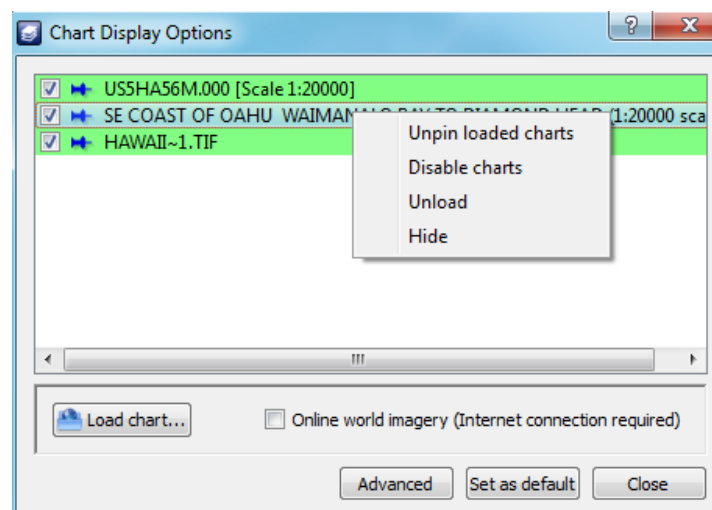


Figure 21. Charts Loaded in Basic Window, with Context Menu

The pin and green color coding are automatically displayed in the database table on any chart added manually, whether in the basic or advanced interface. The pin means that the chart cannot be unloaded by SAMM's auto load function, a feature of the advanced interface. Green highlighting means that the chart is loaded in the mosaic display, whether through manual or automatic loading.

You can control which charts display in the mosaic window from the context menu, accessed by right-clicking on a file. The available commands follow.

- Unpin loaded charts: Allows the auto load function to recognize the chart.
- Disable charts: Prohibits rendering the chart, even if it is loaded.
- Unload: Removes the chart from the loaded list (and the basic interface).
- Hide: Hides the chart from the auto load function, but does not remove it from the database.

The ArcGIS World Imagery provides high-resolution worldwide coverage. It displays under the other layers. This service requires an Internet connection.

- To turn off the Web service, uncheck the box.

## 5.5 Elements of the Advanced Chart Display Options Window

The advanced Chart Display Options window is accessed by clicking the **Advanced** button in the basic Chart Display Options window. From the advanced window, you can populate the database by scanning folders for supported files; preview the files; and customize your chart display by configuring the auto load function, manually adding files, pinning files in the database, and turning the world imagery on and off. The folders added in the advanced interface are preserved between SAMM projects, so a chart database can be built during first time use and will be available in all SAMM projects.



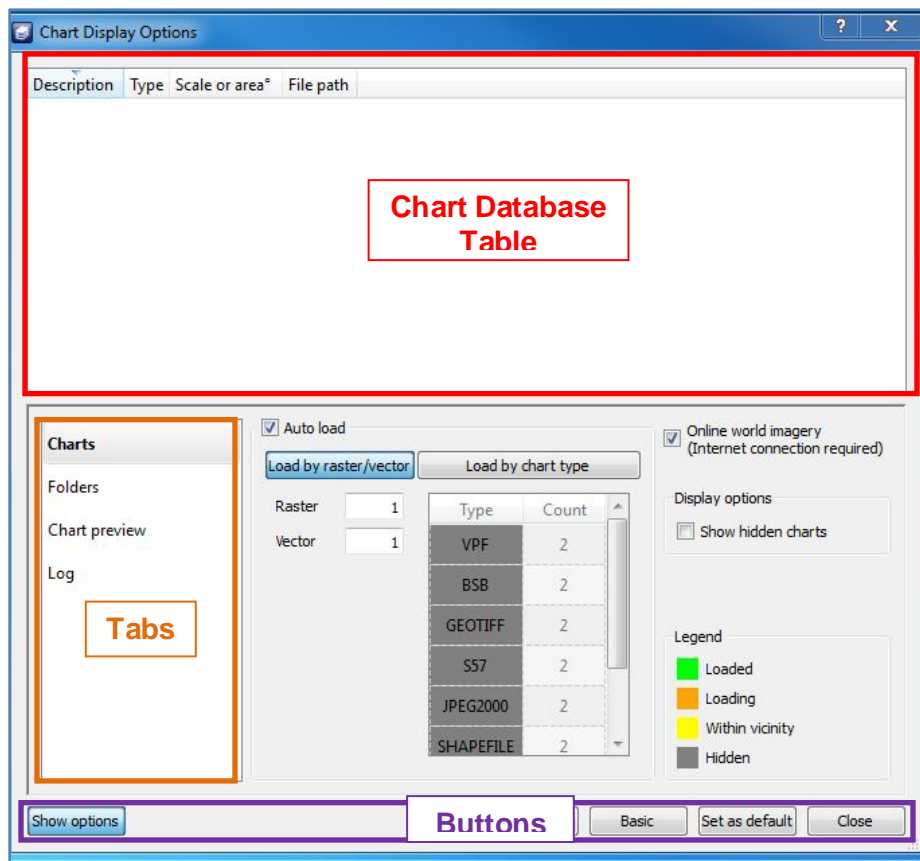


Figure 22. Chart Display Options Window upon Launch

The advanced window includes four tabs: Charts, Folders, Chart Preview, and Log. The chart database table, tab toggles, and buttons appear on every tab (Figure 22). The database table, appearing as the top panel, lists the geospatial data files that are present in the chart database as well as manually loaded charts. They are highlighted in every tab according to the legend appearing on the Charts tab. Unlike the basic window, the advanced table includes columns for the description, type, scale or area, and file path of each file. Files added by folder in the advanced window do not appear in the basic interface.

From the table, you can sort the table by column and select, unpin, disable, unload, and hide charts. The context menu features are the same as those available in the basic interface, except that when charts are unloaded, they do not disappear from the list.

- To sort by column, click on the column name.
- To resize the columns, click and drag on the border.
- To access the context menu, right-click on a chart.

### 5.5.1 Buttons

- The **Show options** button shows or hides the advanced interface tab content.
- The **Manual load...** button opens the manual load window.
- The **Basic** button toggles back to the basic chart display options interface.
- The **Set as default** button saves the current chart auto loading options and world imagery status as the default settings in the application.



- The **Close** button closes the Chart Display Options window. The next time the window is called, it will open to the last interface viewed.

### 5.5.2 The Folders Tab

The Folders tab enables you to populate the chart database from folders stored on your hardware or network. Figure 23 shows the add/scan charts panel of the Folders tab.

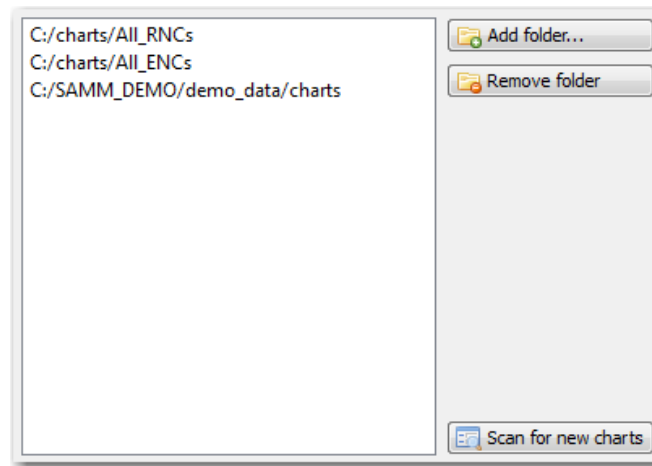


Figure 23. Add/Scan Charts Panel

- The **Add folder...** button loads folders containing chart files to the add/scan charts panel.
- The **Remove folder** button removes files/folders from the add/scan charts panel. All charts located within the folder are removed from the database as well.
- The **Scan for new charts** button scans files from the listed folders and adds them to the database (and populates the database table).

#### 5.5.2.1 Populating the Charts Database

Adding a chart to the database makes it available for use in future projects without having to manually add it. To do this:

1. Add folders: On the Folders tab, click the **Add folder...** button and navigate to the location holding the folder. Click on the folder to select it and click **Select Folder**. Add as many folders as you have containing relevant geospatial data. The scanning algorithm in the next step will recursively search inside all subfolders. For simplicity, consider saving all of your background layers in one main folder and add that folder to SAMB. Take care to preserve the file structure of any acquired DNC folders, or the scanning algorithm may not recognize the charts. When the scanner finds a folder containing a file named LHT, it stops looking for compatible data because the LHT file means that it has found a DNC. Data that are not DNC data stored inside a folder with a DNC LHT file will be lost.
2. Scan folders: After you have added your main charts folders and your root DNC folders, select a folder in the list and click **Scan for new charts**. This process runs in the background so you may continue working in SAMB, with the exception that adding another folder will stop the scanner (rescan the folder if this happens). The scanning function finds all files in the selected folder that are compatible for display in SAMB.

Once SAMM has scanned the folders, the available files appear in the database table (Figure 24). The auto load function in the advanced interface selects charts from this database to display.

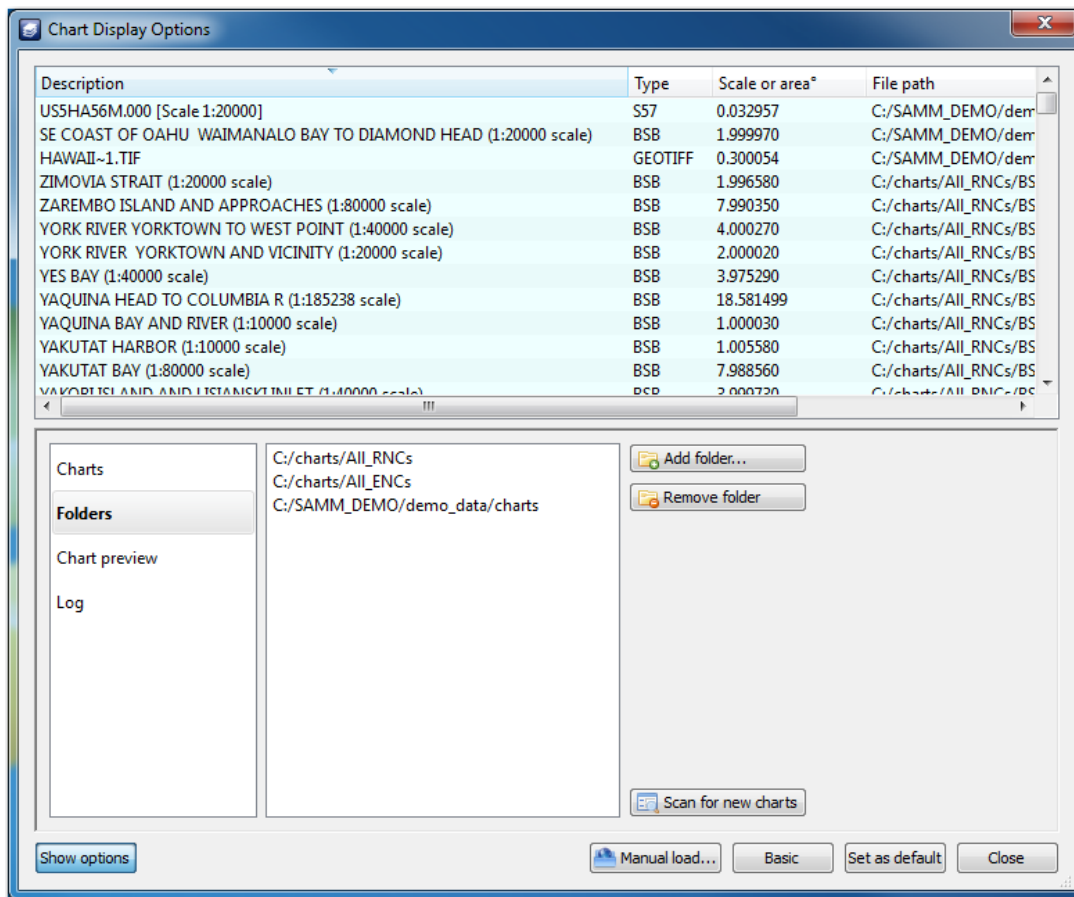


Figure 24. Populated Chart Database

### 5.5.3 The Chart Preview Tab

The previewing charts tab of the advanced interface enables viewing any chart in the database. This helps you get a feel for each type of chart file, if you are unfamiliar, and also shows you the geographic extent and level of detail present in each file. To preview a chart, click on the chart preview tab. The chart highlighted in the database shows in the viewing window. Click on a chart to highlight it. Resize the chart preview panel with a click and drag on the panel border.

### 5.5.4 The Charts Tab

The Charts tab is the default tab displayed (Figure 25).

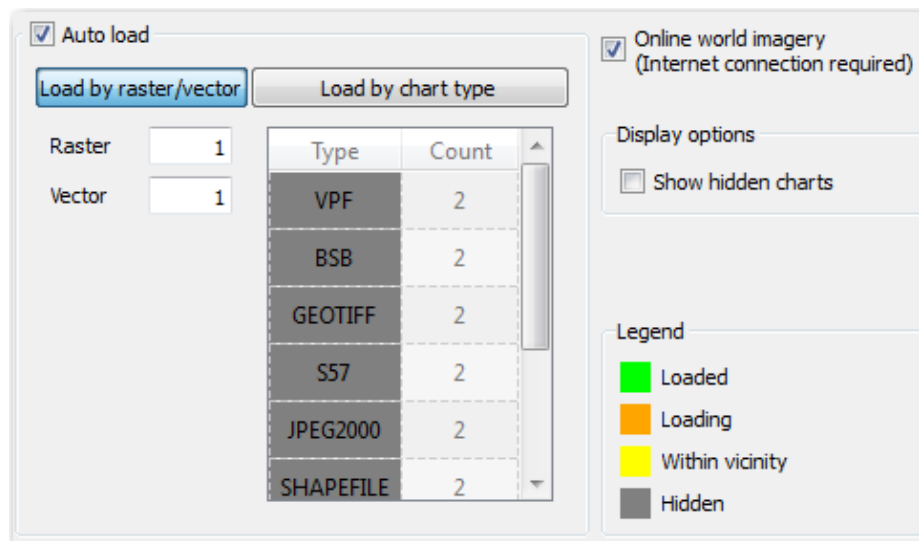


Figure 25. Charts Tab

By default, the **Auto load** and **Online world imagery** checkboxes are checked. Uncheck them to disable the features. The auto load feature loads the files from the chart database that most closely match the resolution (raster) or coverage (vector) of the mosaic window extent into the mosaic window. It constantly looks for charts that satisfy its criteria, set in the **Load by raster/vector** and **Load by chart type** fields.

- The load by raster/vector feature loads charts up to the number entered per type of data file (raster or vector). Click in the **Raster** or **Vector** fields and enter a number to change the numbers.
- The load by chart type feature loads charts of the specific format up to the number per format (VPF for DNC, S-57 for ENC, BSB for RNC, GeoTIFF, shapefile, etc.). Formats are listed in the Type column as they are loaded to the chart database. *The list doesn't forget any file types loaded in all of SAMM's history, so it may present file types that are not present in the database anymore. This happens when you unload the source folder.* Click in the types fields to enter the number per file type that the auto loader should load.

Toggle between the method that the auto load algorithm uses to load charts by clicking on the buttons. The auto loader indicates which method is in use by highlighting the button in blue.

The display options and legend refer to the database table.

- The **Show hidden charts** box unhides files hidden from the table. It does not unhide them from the auto load algorithm. To do this, you must right-click on the chart and click **Unhide**.

#### 5.5.4.1 Color Coding

SAMM color codes the charts in the database so that you can see what charts will be rendered and what charts might be available for rendering. The legend is shown on the Charts tab, but the color coding is used on all tabs of the advanced interface. Only the green, loaded charts display in the basic interface.

#### 5.5.4.1.1 Green

Charts that are loaded are bright green and will be rendered, unless they are disabled. (You may want to disable a chart, instead of unloading it, to prevent the autoloader from replacing it in the display.) Green charts were either automatically loaded because they meet the auto loader's criteria, or they were manually loaded through either

- a. the **Manual load...** button, or
- b. the **Load** command available on the right-click menu on a chart in the database.

Unless the database has been sorted, the green loaded charts always appear at the top of the list, in the order of smallest vector first, then higher resolution rasters.

#### 5.5.4.1.2 Orange

Orange highlighting is transient. These charts are loading, so the orange indicates that SAMM is actively loading them to the mosaic window. They will turn green when they are loaded.

#### 5.5.4.1.3 Yellow

The yellow charts follow; these are yellow because they

- a. don't meet the auto-load criteria but intercept the mosaic window extent or
- b. they were manually unloaded using the **Unload** command from the database context menu.

The yellow charts are within the vicinity of the project, and are available to the autoloader if the auto load settings are changed. The charts are ordered using the same convention as the green ones, with vectors covering the smallest area first, then rasters of higher resolution. If the database is sorted, they will reorder according to the sort but this does not affect the display.

#### 5.5.4.1.4 Gray

Hidden charts are highlighted in grey, when they are shown. They are hidden from the auto loader. You may toggle their display in the chart database on and off from the **Show hidden charts** checkbox under Display options on the Charts tab.

#### 5.5.4.2 Manually Loaded vs. Folder Added Chart Behavior

SAMM's chart loader determines how to treat a chart based on how it was loaded. You can force the manually loaded or folder added behavior using the context menu commands.

SAMM's auto load algorithm either recognizes a chart in the database as suitable for loading, or it doesn't. If it doesn't recognize the chart, that chart file has either been pinned, so it can be rendered, or it is hidden, and it cannot be rendered. SAMM automatically pins every chart that has been loaded manually, either in the basic interface or using the **Manual load...** button in the advanced interface. You can also pin any chart by right-clicking on it in the database list and clicking **Pin Loaded Chart** (if the chart is already loaded) or clicking **Load** (to load the chart, which SAMM then automatically pins), or double-clicking on the chart.

You can hide any chart from the auto load algorithm by right-clicking on it and clicking **Hide**. It disappears from the database list, but will display if you click the **Show hidden charts** box on the Charts tab. To reveal these charts to the auto load algorithm, you must right-click on the hidden chart and click **Unhide**. If you click **Load** on a hidden chart, it will load it and then pin it. It will still be hidden from the algorithm, but will then be available for rendering.

Charts added through a folder (and therefore added to the charts database) will not be available in the basic interface, unless you manually pin them or the autoloader has loaded them. The autoloader looks at these charts in order to find charts suitable for rendering.

Every loaded chart has the option to be disabled, or to prevent it from rendering without hiding it. This keeps the chart in the loaded station, which means the autoloader counts it as a loaded chart, but the chart does not render.

### 5.5.5 The Log Tab

The log tab reports errors in the chart module, including the database, scanner, and renderer.

## 5.6 Advanced Chart Loader Tutorial

There are three ways to display background content in the mosaic window using the advanced interface. To load background layers in SAMM, follow the steps in Table 10.

**Table 10. Load and Display Charts**

To auto load files from folders:	To load Web-hosted content:	To load individual files:
<ol style="list-style-type: none"> <li>1. Click the <b>Chart background options</b> icon in SAMM's main toolbar.</li> <li>2. Click the <b>Advanced</b> button.</li> <li>3. Click the <b>Folders</b> tab.</li> <li>4. Click <b>Add Folder</b>.</li> <li>5. Navigate to and click the folder containing charts and/or geocoded files.</li> <li>6. Click <b>Select Folder</b>.</li> <li>7. Click <b>Scan for new charts</b>.</li> <li>8. Click the <b>Charts</b> tab.</li> <li>9. Ensure the <b>Auto load</b> box is checked.</li> <li>10. Click <b>Close</b> to exit the window.</li> </ol>	<ol style="list-style-type: none"> <li>1. Click the <b>Chart background options</b> icon in SAMM's main toolbar.</li> <li>2. Click the <b>Advanced</b> button.</li> <li>3. Stay on the <b>Charts</b> tab.</li> <li>4. Ensure the <b>Online chart</b> box is checked.</li> <li>5. Click on the type of map or imagery you want to select it.</li> <li>6. Uncheck the <b>Auto load</b> box (for the playback tutorial).</li> <li>7. Click <b>Close</b> to exit the window.</li> </ol>	<ol style="list-style-type: none"> <li>1. Click the <b>Chart background options</b> icon in SAMM's main toolbar.</li> <li>2. Click the <b>Advanced</b> button.</li> <li>3. Stay on the <b>Charts</b> tab.</li> <li>4. Click the <b>Manual load...</b> button on the bottom of the window, next to the <b>Close</b> button.</li> <li>5. Navigate to and click the chart (or other geocoded files).</li> <li>6. Click <b>Open</b>.</li> <li>7. Click <b>Close</b> to exit the window.</li> </ol>

## 5.7 Chart Customization Commands

The features for customizing the chart display are collected in Table 11 with the methods available to execute the commands.

**Table 11. Chart Customization Commands**

Command	Action
Select chart	<ul style="list-style-type: none"> <li>• In the chart database table, click or right-click on the chart.</li> </ul>
Select multiple adjacent charts	<ul style="list-style-type: none"> <li>• In the chart database table, click on the first chart, hold Shift, and click on the last chart.</li> </ul>

Command	Action
Select multiple non-adjacent charts	<ul style="list-style-type: none"> <li>In the chart database table, click on the first chart, hold Ctrl, and click on each subsequent chart.</li> </ul>
Hide charts from chart database table	<ul style="list-style-type: none"> <li>In the chart database table, right-click on the chart and click <b>Hide</b>.</li> </ul>
Show hidden charts in chart database table	<ul style="list-style-type: none"> <li>In the display options and legend panel of the Charts tab, click the <b>Show hidden charts</b> checkbox.</li> </ul>
Unhide hidden charts	<ul style="list-style-type: none"> <li>After showing the hidden chart, in the chart database table, right-click on the charts and click <b>Unhide</b>.</li> </ul>
Turn hide/unhide a chart from the auto loader while keeping the chart loaded	<ul style="list-style-type: none"> <li>In the chart database table, right-click on the chart and click <b>Pin loaded chart/Unpin loaded chart</b>.</li> </ul>
Unload manually loaded chart from the chart database table	<ul style="list-style-type: none"> <li>In the chart database table, right-click on the chart and click <b>Unload</b>.</li> </ul>
Enable/Disable forced display of a loaded chart in the mosaic window	<ul style="list-style-type: none"> <li>In the chart database table, check/uncheck the box next to the chart.</li> <li>In the chart database table, right-click on the chart and click on <b>Disable charts</b> or <b>Enable charts</b>.</li> </ul>
Restrict the auto load feature to a certain number of raster/vector charts	<ul style="list-style-type: none"> <li>In the auto load panel of the Charts tab, ensure the <b>Auto load</b> box is checked, then enter the number of raster charts in the <b>Raster</b> field and the number of vector charts in the <b>Vector</b> field.</li> </ul>
Restrict the auto load feature to a certain number of charts by chart type	<ul style="list-style-type: none"> <li>In the auto load panel of the Charts tab, ensure the <b>Auto load</b> box is checked, then click the <b>Load by chart type</b> button and enter the number of each type of chart in the chart type fields.</li> </ul>
Turn the world imagery on/off	<ul style="list-style-type: none"> <li>In the online chart panel of the Charts tab, ensure the <b>Online chart</b> box is checked and click on the desired service (imagery, topography, weather).</li> </ul>
Disable the auto load function	<ul style="list-style-type: none"> <li>In the auto load panel of the Charts tab, click the box next to the <b>Auto load</b> field to uncheck it.</li> </ul>
Set the current settings as default	<ul style="list-style-type: none"> <li>In the display options and legend panel of the Charts tab, click the <b>Set as default</b> button.</li> </ul>
Preview the chart	<ul style="list-style-type: none"> <li>In the chart database table of the Chart preview tab, click on the chart.</li> </ul>

## 6 Add Files or Begin Acquisition

SAMM can mosaic data in acquisition, playback, or post-processing modes. To mosaic data properly, SAMM accesses two classes of data: the sonar data itself and metadata. When in playback or post-processing mode, SAMM gets these data from the raw data files. During acquisition, however, SAMM receives these data either as they are broadcasted from the sonar software, or directly from the sensors. *At this time, M3 and BlueView owners must interface with the sonar software, and Gemini owners must interface directly with the navigation/heading sources and the sonar.*

The first part of this section describes how to start a project in post-processing or playback mode by adding data files to the project. The second part describes how to interface with the metadata sources, and the third part provides instructions for interfacing with supported sonar systems. The Add data screen (Figure 26), accessed by clicking the **Add data** icon, controls file loading and interfacing with a sensor or sonar software program.



Figure 26. Add Data Screen

### 6.1 Add Files in Playback or Post-Processing Mode

Follow the instructions in Table 12 to load or playback data. The playback instructions are written specifically for the demo data. Supported data formats for post-processing and playback include M3 processed data files (\*.imb), ProViewer (\*.son), and OIC SAMM (\*.msk). Practice with SAMM in playback mode prior to conducting a survey in acquisition mode.



Table 12. Add Data



To Add Data for Post-Processing Mode	To Add Data for Playback Mode
	
<ol style="list-style-type: none"> <li>1. Click the <b>Add data</b> icon.</li> <li>2. Click <b>Load</b>.</li> <li>3. Navigate to the directory containing the files.</li> <li>4. Click on a file, then press Ctrl+A to select all of them.</li> <li>5. Click <b>Open</b>.</li> <li>6. Monitor file loading progress in the status bar on the bottom right. The swaths display when all files are loaded.</li> </ol>	<ol style="list-style-type: none"> <li>1. Click the <b>Add data</b> icon.</li> <li>2. Click <b>Playback</b>.</li> <li>3. Navigate to the directory containing the files (C:\SAMM_DEMO\demo_data).</li> <li>4. Click on a file, then press Ctrl+A to select all of them.</li> <li>5. Click <b>Open</b>.</li> <li>6. Monitor file loading progress in the status bar on the bottom right.</li> <li>7. Click the <b>Start</b> button on the playback controls. The survey playback begins.</li> </ol>

Figure 27 shows SAMM's GUI playing the sample data.

- Live info and playback controls appear in the Swath list's place, and the list has shifted to below the playback controls.
- Swath\_0, referenced in the Swath list, is drawn behind the vessel in the mosaic window.
- World imagery is layered under the vessel and swaths in the mosaic window.
- The **Add data** icon has a small red x and the **Record toggle** icon is indented.
- The file loading progress is present in the status bar.

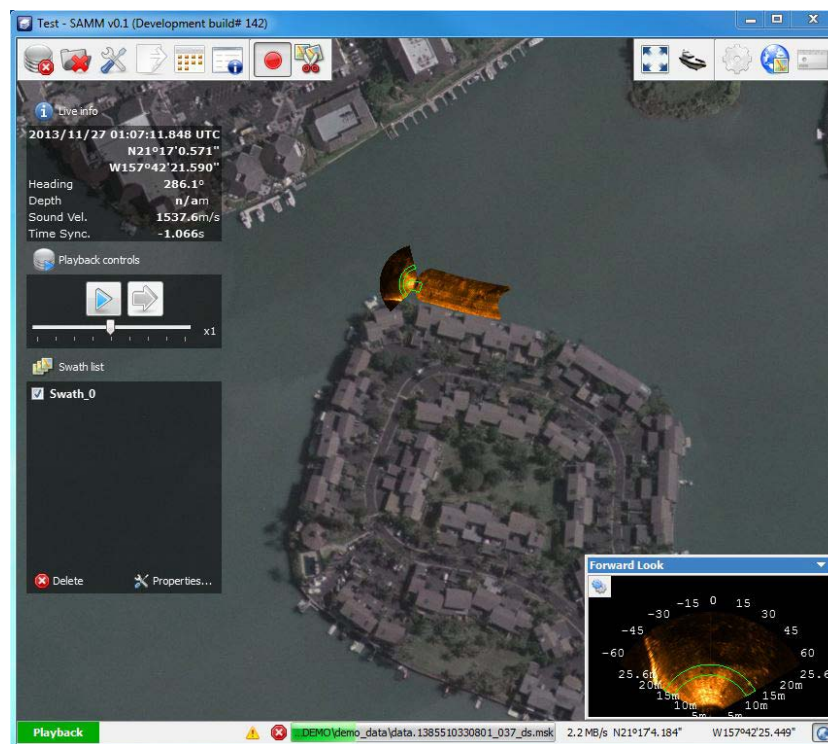


Figure 27. GUI in Playback Mode



*SAMM does not support adding distant data to the same project at this time. Please start a new project for each new region of operation.*

## 6.2 Interface with Metadata Sensors

SAMM can receive the metadata inputs of position, heading, and time (if available) through one serial port for integrated systems, two serial ports, or GreenSea navigation. SAMM then automatically detects the NMEA data protocols and selects the most accurate type available.

The following string types are listed in order of preference:

- Lon/Lat
  - PTNL, GGK
  - GGA
  - RMC
  - GLL
- Heading
  - HDT
  - *(HDG, HDM, DPT, and RMC are not yet supported.)*
- Time and Date
  - ZDA (While not required for mosaicking, it will increase the accuracy of the mosaic if available.)

Please set your navigation devices to the highest available data protocol in this list. *Please note that at this time SAMM receives data only in the National Marine Electronics Association (NMEA) formats. If you have alternative data string formatting, please contact OIC.*

SAMM assumes the received lon/lat are on the WGS 1984 datum. This is the most frequently used datum for navigation systems because it is the datum used by the Global Positioning System (GPS) satellite constellation. Confirm that your navigational system is set to the WGS 1984 datum.

To configure the metadata input:

1. Click the **Add Data** icon.
2. Pick **Gemini** from the dropdown menu.  
(*Navigation/heading interfacing is not available for other supported sonar systems at this time.*)
3. Click the checkbox next to **Enable serial port** on the COM port A tab or click the checkbox next to **GreenSea navigation** (Figure 28).  
Enabling GreenSea navigation disables the serial ports. If you are using an integrated position/heading system, you need only configure Com port A.
4. In the **Port** field, enter the port number for the serial port into which the sensor is plugged in the format COM#.
5. Ensure that the **Baud**, **Data bits**, **Parity**, and **Stop bits** fields match the corresponding sensor settings.
6. If you are using two different ports for position and heading, repeat steps 3 through 5 on the COM port B tab.

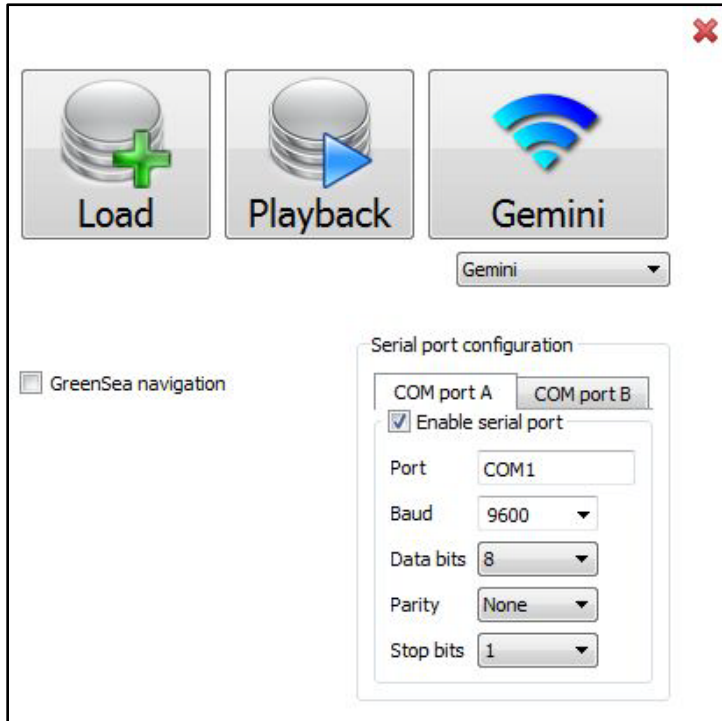


Figure 28. Navigation Interfacing

## 6.3 Interface with a Forward-Looking Sonar

This section describes how to connect SAMM with each brand of supported multibeam imaging sonar.

### 6.3.1 Kongsberg Mesotech M3

SAMM interfaces with the M3 sonar by receiving a data and metadata string from the sonar software directly. The M3 sonar software is capable of running in several application modes. If you run the sonar in EIQ -Fine or EIQ- Ultrafine modes without remaining stationary, the resulting mosaic may be distorted (see the M3 manual for reference).

To interface with the M3 sonar:

1. Launch the M3 sonar software and connect the sonar as usual.
2. Launch SAMM.
3. Click the **Add data** icon.
4. Pick **M3** from the dropdown menu (Figure 29).
5. If SAMM and the M3 software are running on the same computer, do not change the IP address from LOCALHOST. If the sonar software is running on a different computer than SAMM, enter 192.168.1.233 (sonar software host computer) in the **IP address** field.
6. Do not change the port number from 20001 unless you change it in the sonar software. Then, enter the matching port number in the **Port** field.
7. Click the sonar button



8. Monitor the connection status in the status bar on the bottom left. Acquisition begins automatically. SAMM flashes a warning if it is not recording. Click the **Record toggle** icon to switch recording on and off.

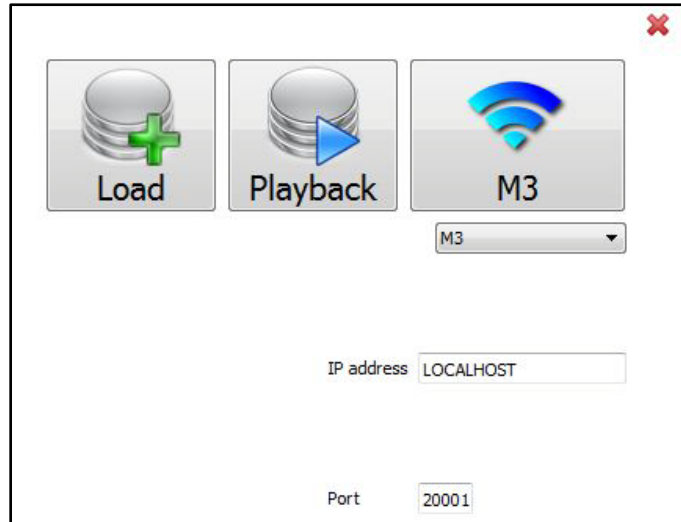


Figure 29. M3 Interfacing

### 6.3.2 Teledyne BlueView 2D Multibeam Imaging Sonar

Similar to M3 interfacing, SAMM interfaces with the BlueView family of 2D imaging sonar systems by receiving a data and metadata string from the sonar software, ProViewer, directly. ProViewer, however, must be configured to push data to SAMM. The following instructions and screenshot were valid with ProViewer 4 at the time of this writing, but may not be up to date. Please consult the ProViewer manual for the most accurate instructions.

To interface with ProViewer:

1. Launch ProViewer and connect the sonar as usual.
2. Configure ProViewer for streaming data to SAMM by clicking on the gears icon, clicking on the Data Streaming tab, and clicking the checkbox next to **RTheta Images** (match Figure 30). If you are running SAMM on a different computer than ProViewer, enter the IP address in the field. Otherwise, enter the local IP address (192.168.1.3 if using the IP address suggested in the ProViewer manual). Click **Show Advanced Settings** if the IP address is unavailable.
3. Turn on the data broadcasting by clicking the AppEx broadcast icon in ProViewer.



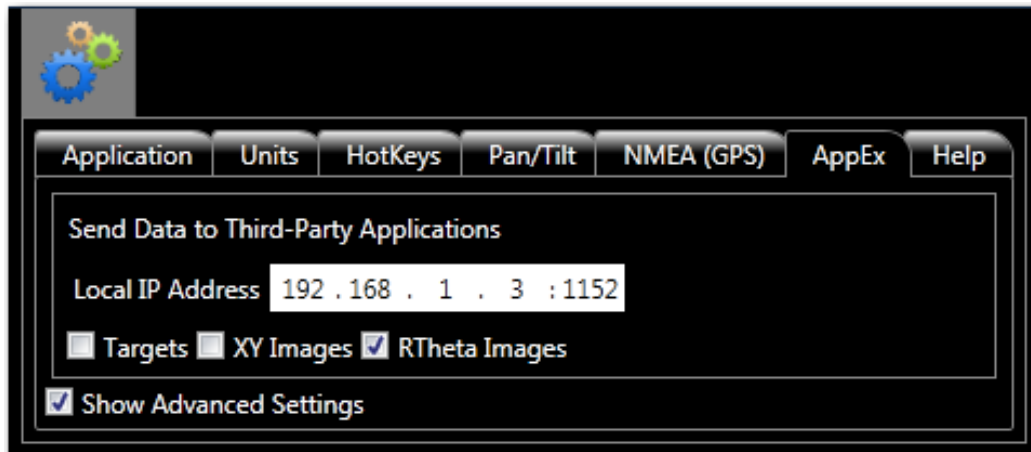


Figure 30. ProViewer Data Streaming Configuration

4. Launch SAMM.
5. Click the **Add data** icon.
6. Pick **ProViewer** from the dropdown menu (Figure 31).
7. If SAMM and ProViewer are running on the same computer, do not change the IP address from LOCALHOST. If ProViewer is running on a different computer than SAMM, enter 192.168.1.3 (sonar software host computer) in the **IP address** field. Do not change the port number from 1152 unless you changed it in the sonar software. Then, enter the matching port number in the **Port** field. *(The option to log data in \*.son format is not yet available.)*
8. Click the sonar button



Figure 31. BlueView Interfacing

9. Monitor the connection status in the status bar on the bottom left. Acquisition begins automatically. SAMM flashes a warning if it is not recording. Click the **Record toggle** icon to switch recording on and off.

### 6.3.3 Trittech Gemini 720i and 720id

For the M3 and BlueView sonars, SAMM receives the sonar data and metadata through the respective software packages. For the Trittech Gemini, SAMM interfaces directly with the sonar, so no Gemini software need be run. Please exit the Gemini program before launching SAMM,

and note that you must complete interfacing with the navigation sensors before beginning acquisition of Gemini data.

To interface with the Gemini sonars:

1. Connect the sonar as usual.
2. Launch SAMM.
3. Click the **Add data** icon.
4. Pick **Gemini** from the dropdown menu (Figure 32).
5. Configure the metadata input (see section 6.2).
6. Click the sonar button



7. Monitor the connection status in the status bar on the bottom left. Acquisition begins automatically. SAMM flashes a warning if it is not recording. Click the **Record toggle** icon to switch recording on and off.

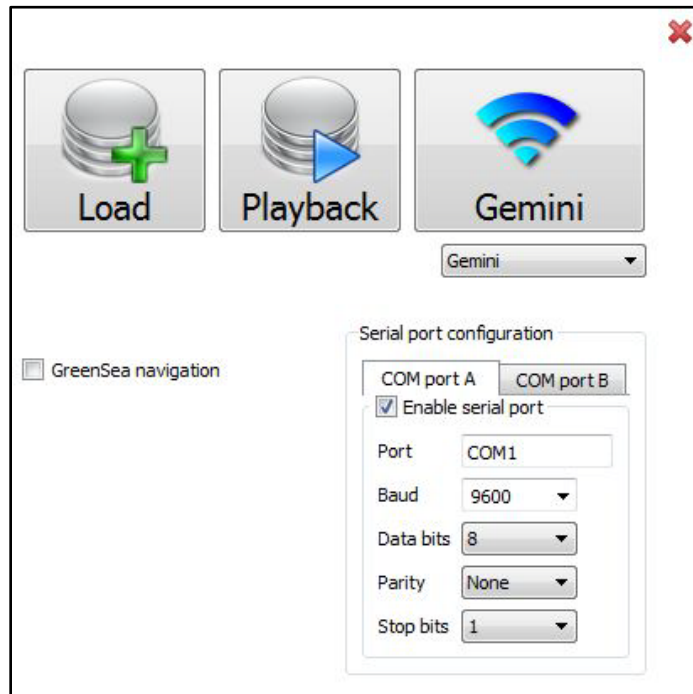


Figure 32. Gemini Interfacing

#### 6.3.3.1 Troubleshooting

If you experience connection problems with your Tritech Gemini, try to solve or isolate the connection problem using the following steps:

1. Close SAMM and launch the Gemini software. If the sonar software does not work, consult the Gemini owner's manual to solve the connection issue. *Please note that the Gemini software and SAMM cannot run at the same time.*
2. If you are still not receiving Gemini data in SAMM (but the Gemini software works), you may try to:
  - Disable all network adaptors other than the Ethernet port that the sonar is connected to in the Windows Explorer Network and Sharing Center. In Windows 7, access this center through the Network and Internet page on your computer's Control Panel. Then, click **Change adapter settings** in the left panel. Right-click on the connections that are not connected to the sonar and click **Disable**.
  - If the problem persists, you may try to disable your firewall or set a firewall exception for the SAMM software.
3. If you are not receiving position/heading data:
  - If using a serial port, please make sure your GPS/compass is outputting NMEA Lon/Lat message and NMEA HDT messages for heading. Make sure that serial communication settings in SAMM (baud rate, parity, stop bit) match your device(s).
  - If you are using GreenSea navigation data, make sure to check the GreenSea navigation box on the Add data screen. This disables the serial port input.
4. If the PPI does not look correct, try viewing the sonar properties by clicking the **Properties** icon on the main toolbar and identifying the problem from the attributes.

### 6.3.3.2 Sonar Controls

The Gemini sonar controls include range and gain slider bars, a checkbox for fixing the sound velocity, and a checkbox for disabling the auto ping mode (Figure 33).

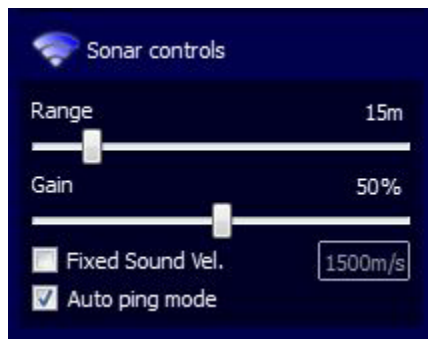


Figure 33. Gemini Sonar Controls

The range slider enables the user to specify the maximum range the sonar will scan (or ping period). Longer ranges mean longer ping periods, since the ping must travel further. The gain slider enables the user to control the relative sonar receive gain. Gemini users may experiment with this setting according to their preference and water and target conditions; OIC has found the 60-75% range a useful starting point in our test marina. Setting the gain too high introduces artifacts into the sonar data (Figure 34).

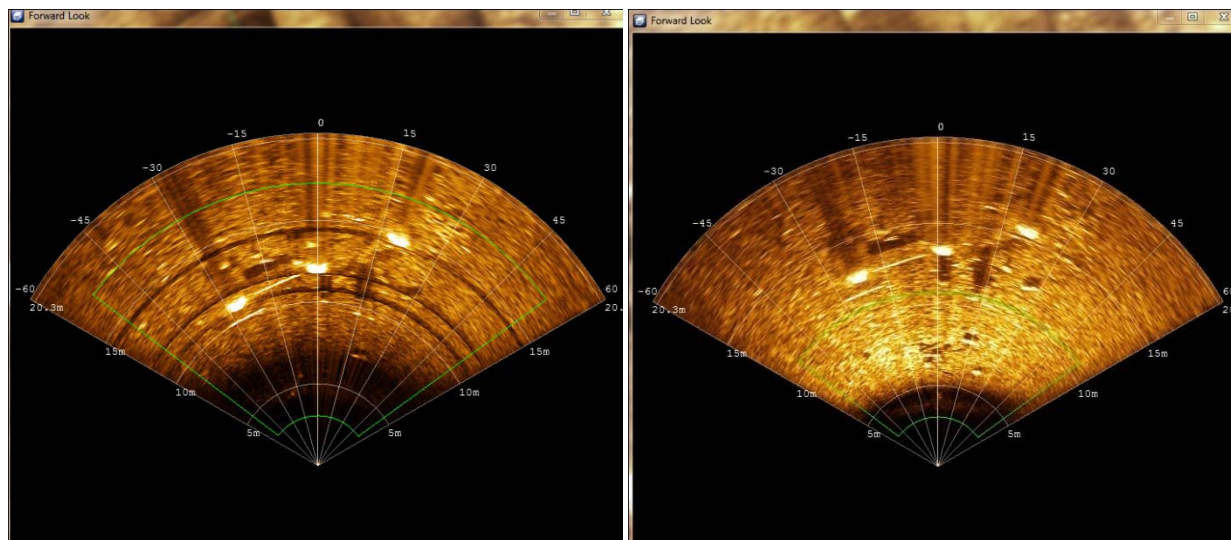


Figure 34. Black banding artefacts with high gain and the same data with lower gain.

The current sensor sound velocity displays at sensor depth in the sonar controls box (in meters/second). The sound velocity value can be overridden by checking the checkbox next to the **Fixed Sound Vel.** box. This is typically performed when actual sound velocity sensor data are not available; the Tritech Gemini is equipped with a sound velocity probe, so sensor data should be used if accurate. Sound velocity generally varies from 1450 m/s for very cold waters to 1550 m/s for very warm waters. In most circumstances you do not need to change the sound velocity.

Auto ping mode is the default mode and should be used most of the time. In this mode, the sonar controls when it pings; it pings again when it has pushed the last processed ping to the receiving software. If you disable auto ping mode, the sonar will wait to ping until it has received the command to ping from SAMM. If the ping backlog gets too high, SAMM may discard some raw ping records in an attempt to keep up. Auto ping mode is sufficient for most computer systems and should be used unless SAMM is overwhelmed with ping packets. The Auto ping mode is analogous to the Continuous mode in Triton's Seantech Pro software, while disabling the Auto ping mode is analogous to the Triggered mode.

This page is intentionally left blank.



## 7 Display and Processing Settings





SAMM has many display options that enable you to control how your PPI and mosaic appear. These settings control some elements of the GUI, like the mosaic window and the live info feeds, or the data display. In the section, we describe how to:

- adjust the mosaic window display;
- manage swaths using the Swath list;
- control playback;
- toggle the display units; and
- adjust the post-processing rendering options.

### 7.1 Adjust the Mosaic Window Display

You can control the content and extent, or geographic boundaries, of the mosaic window. This manual described how to load background content (charts and imagery) into the mosaic window in Section 5. Table 13 lists all available commands to adjust the extent and behavior of this window and how to execute the commands.

**Table 13. Mosaic Window Extent Commands**

Command	Action
Zoom to the extent of the survey 	<ul style="list-style-type: none"> <li>• In the view toolbar, click the <b>Reset View to the Entire Survey</b> icon.</li> </ul>
Zoom in to center 	<ul style="list-style-type: none"> <li>• Roll the mouse wheel away from you.</li> <li>• Press the - key.</li> <li>• Use a two finger scroll toward you on a laptop track pad.</li> <li>• In the view toolbar, click the <b>Zoom in</b> icon.</li> </ul>
Zoom out from center 	<ul style="list-style-type: none"> <li>• Roll the mouse wheel toward you.</li> <li>• Press the Shift++ keys.</li> <li>• Use a two finger scroll away from you.</li> <li>• In the view toolbar, click the <b>Zoom out</b> icon.</li> </ul>
Zoom to start of survey	<ul style="list-style-type: none"> <li>• Press the spacebar.</li> </ul>
Reset the sensor to the center 	<ul style="list-style-type: none"> <li>• In the view toolbar, click the <b>Auto adjust the display to follow the sensor</b> icon.</li> </ul>
Pan	<ul style="list-style-type: none"> <li>• Click anywhere in the mosaic window and drag your mouse.</li> </ul>

You may also hide the PPI and vessel icon from the mosaic window. To do this:

1. In the mosaic toolbar, click the **Display options** icon.
2. Click the checkbox next to **Show FLS overlay during Live/Playback**.
3. Click outside of the dropdown window to hide the window.

### 7.2 Manage Swaths

SAMM lets you manage swath layers during acquisition, playback and in post-processing mode. The Swath list controls layering in the mosaic window. The commands that fit into the swath

management class are listed in Table 14, with directions for execution. Please keep in mind that these commands do not affect the raw data in any way.

**Table 14. Swath Management Commands**

Command	Action
Turn off in mosaic window	<ul style="list-style-type: none"> <li>Click the box next to the name to uncheck it.</li> </ul>
Turn on in mosaic window	<ul style="list-style-type: none"> <li>Click the box next to the name to check it.</li> </ul>
Rename	<ul style="list-style-type: none"> <li>Click the name to select it, then click it again to activate keyboard input. Enter the new name.</li> </ul>
Bring forward/Send backward	<ul style="list-style-type: none"> <li>Click the name to select it, then drag to the desired layering position in the list.</li> </ul>
Delete	<ul style="list-style-type: none"> <li>Click the name to select it, then click the <b>Delete</b> button.</li> <li>Right-click the name and click <b>Delete</b>.</li> </ul>
Change properties	<ul style="list-style-type: none"> <li>Click the name to select it, then click <b>Properties</b> to open the Properties window (<i>not yet available</i>)</li> </ul>
Select multiple consecutive swaths	<ul style="list-style-type: none"> <li>Click the first swath to select it, then hold Shift and click the last swath.</li> </ul>
Select multiple nonconsecutive swaths	<ul style="list-style-type: none"> <li>Click the first swath to select it, then hold Ctrl and click the other swaths.</li> </ul>

### 7.2.1 Swath Management and Playback Tutorial

These steps demonstrate most of the swath management and playback features. Follow along using the demo data in playback mode, checking the results on your screen against the bulleted results. (*Swath properties are unavailable at this time. Please adjust rendering options from the Display options window.*)

- While continuing playback, in the Swath list, click the checkbox next to Swath\_0.
  - The swath turns off in the mosaic window.
- Click the checkbox again.
  - The swath shows in the mosaic window.
- Using the playback controls, click **Pause**.
  - The vessel, live info feed, and file loading progress freeze.
- Click **Play**.
  - The vessel starts moving again.
  - The Live info feeds update.
- Drag the **Speed** slider bar to the left.
  - The vessel slows down.
- Drag it to the right.
  - The vessel speeds up.
- Drag the speed back to the middle (x1).
  - The vessel returns to the normal speed.
- Wait until the vessel turns. Then, in the main toolbar, click the **Manually start a new swath** button.
  - Swath\_1 appears in the Swaths toolbar above Swath\_0.
- Turn Swath\_1 on and off. Pay attention to what it looks like.

10. Click `Swath_0` and then drag it over `Swath_1`.
  - `Swath_0` is layered over `Swath_1`.
11. Turn off `Swath_0`.
  - `Swath_1` is now visible.
12. In the main toolbar, click the **Record** icon.
  - The boat moves without painting a swath underneath it.
  - Text in the bottom left of the taskbar changes to `Live`.
13. Click **Record** again.
  - SAMM paints the swath behind the vessel again.
  - The text in the bottom left of the task bar changes back to `Recording`.
  - `Swath_2` appears in the Swath list.
14. Click on `Swath_0` and then click **Delete**.
  - The swath disappears from the mosaic display. This does not affect the raw data (the files in the folder that you added), but the swath is gone from this particular project unless you add the source data file again.
15. Click on `Swath_2`, then click on it again. Enter `Second Swath`.
  - The name changes to `Second Swath`.

## 7.3 Toggle Display Units

Display units of parameters may be changed from the Configuration window. Section 4.3 described how to change the display units. This section provides a tutorial to supplement Section 4.3.

### 7.3.1 Display Units Tutorial

This tutorial shows how to change position units from the Configuration window and toggle position formats in the status bar.

1. Click the **Configuration** icon.
2. In the Display panel, click the **Change** button.
3. Select **Degree minute second** from the **Longitude/Latitude** dropdown box.
  - The position fields in the Live Info feed change to degree minute seconds.
  - The cursor position unit correspondingly changes in the bottom right of the status bar.
4. Click the **Reset to International Standard (IS) units** button to reset the default settings.
5. Click the world icon to the far right of the status bar (Figure 34).
  - The units toggle between GPS WGS 1984 Longitude and Latitude coordinates in the format set from the Configuration window and Universal Transverse Mercator coordinate meters.

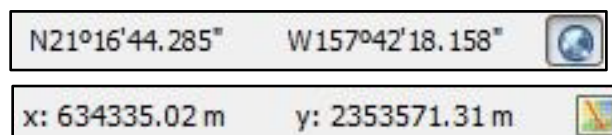


Figure 35. Status Bar Position Units

## 7.4 Apply Imagery Processing Options

SAMM's processing options are available in acquisition and playback modes (*the processing features available in post-processing mode are limited at this time*). You can process FLS data by clipping the FLS image range, applying smoothing to the navigation metadata, or adjusting the rendering options. These features do not affect the raw data in any way. The imagery processing options are available from the **Display options** icon in the mosaic toolbar (Figure 35). The processing options are as follows.

- **Arc Coverage:** Adjusting these values trims the outer arc range of the FLS imagery data. The minimum value will begin clipping from the port side of the FLS sector and the maximum value will define the trim originating from the starboard side. The values used here are relative to the arc length of the actual data (percentage).
- **Range Coverage:** Adjusting these values clips the inner and outer portions of the FLS imagery data. The minimum value clips from the sonar head, and the maximum value clips from the outer edge of the data. The values used here are relative to the range of the actual data (percentage).
- **Contrast:** The brightness and gamma rendering options change the intensity and emphasis on light or dark tones in the imagery, respectively.
- **Feathering:** Adjusting the feathering value controls how the imagery is blended together where FLS images overlap. A value of 0% will create a sharp boundary at the overlaps, and increasingly higher values will cause more blending.

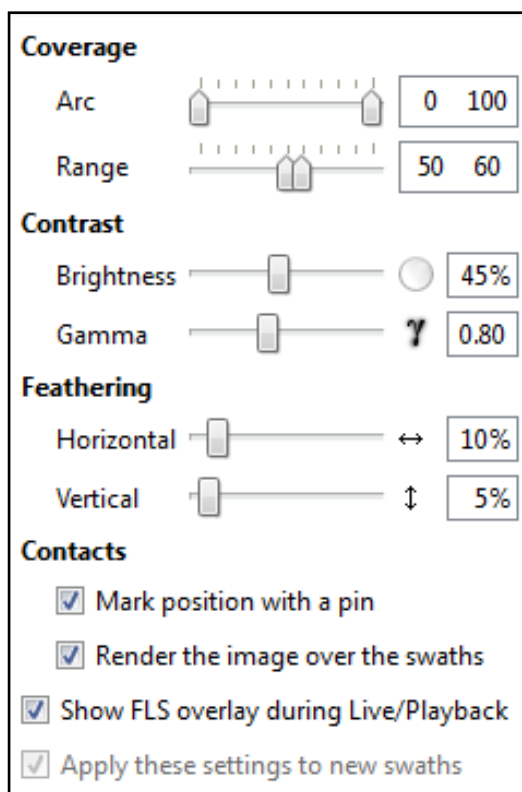


Figure 36. Imagery Processing Options

Contact display settings for the mosaic window are also found on the display panel. You may turn the pin and the contact image on or off in the mosaic window.

### 7.4.1 Swath Properties

Additional imagery processing and display options are available from the **Properties** button on the Swath list (Figure 36). To open the window, select swath(s) in the Swath list and then click **Properties**. *At this time, contrast and opacity are the only available features*. Save the settings by clicking **OK** before moving to the next swath.

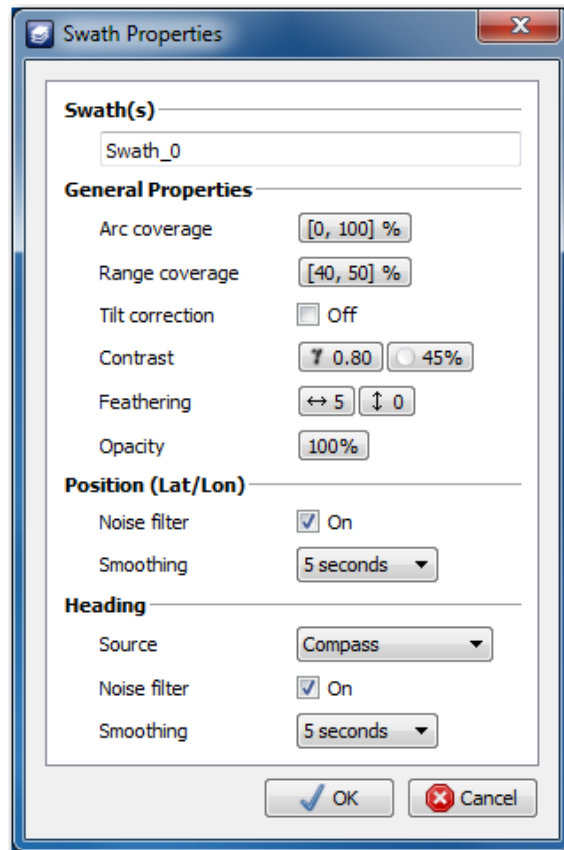


Figure 37. Swath Properties Window

The swath properties post-processing options can be applied to individual swaths in the post-processing mode (*unavailable at this time*). This enables you to post-process your data without having to play it back. Settings that are applied to the sonar data include the arc and range coverage, contrast, and feathering options available during acquisition and playback, plus opacity and tilt correction. The metadata post-processing features include noise and smoothing filters.

- Opacity: Changing the opacity applies transparency to the swath.
- Tilt correction: (*not yet implemented*)
- Noise filter: (*not yet implemented*)
- Smoothing: (*not yet implemented*) The smoothing function averages the position or heading values over the user-defined interval of two, five, ten, or twenty seconds.

The heading subpanel allows you to designate if the heading source is a compass or a calculated course (*difference not yet implemented*).

#### 7.4.2 Playback of \*.son files

A sound velocity input box appears when SAMM plays back \*.son files from the ProViewer software (Figure 37). Entering the value that is closer to the true speed of sound of water during your survey will reduce the black banding artifact in the image.



Figure 38. Sound Velocity Control

### 7.4.3 Trimming Tutorial

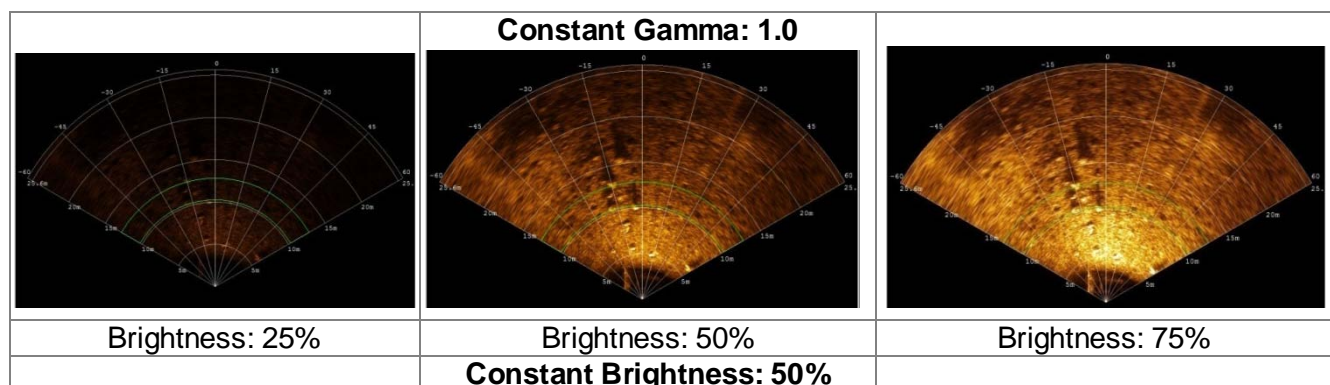
This example shows how to apply the trimming filters. The observable effect of each function conveys more information than words, so make sure you are comfortable with how the default view looks before proceeding.

1. Click the **Display options** icon in the mosaic toolbar.
2. In the Coverage panel, drag the arc slider bars individually to 20 and 80, or input these values.
  - The green sector outlines in the Forward Look and mosaic window narrow to 60% of its range, losing 20% of the arc length from each edge.
  - The swath width narrows by the same factor as SAMM draws it behind the vessel in the mosaic window.
3. Return the arc slider bars to 0 and 100.
  - The sector outline and swath width return to full coverage.
4. In the Coverage panel, drag the right range slider bar to 60.
  - The sector outline shrinks to 60% of its full coverage in the Forward Look and mosaic windows.
  - The swath coverage shrinks correspondingly as SAMM draws it in the mosaic window.
5. Drag the left range slider bar to 30.
  - The sector outline retreats to 30% of its coverage from the center of the circle, and the swath coverage responds.

### 7.4.4 Rendering Tutorial

This tutorial walks you through changing some of the rendering options available in SAMM. The rendering options include changing the colormap, and the brightness, contrast, opacity, and feathering values.

1. Click the **Configuration** icon in the main toolbar.
2. In the Swath colormap panel, select **Reverse Gray** from the Active dropdown menu .
  - The active swath changes to a greyscale where objects are light and object shadows are dark.
3. Change it back to **Goldenrod** and click **Close**.
4. Click the **Display options** icon in the mosaic toolbar.
5. Drag the Brightness slider bar to the left and right.
  - Watch the intensity of the PPI and mosaic change for the entire active swath (Figure 37).
6. Drag the Gamma slider bar to the left and right.
  - Changing the gamma value enhances light or dark tones (Figure 37).





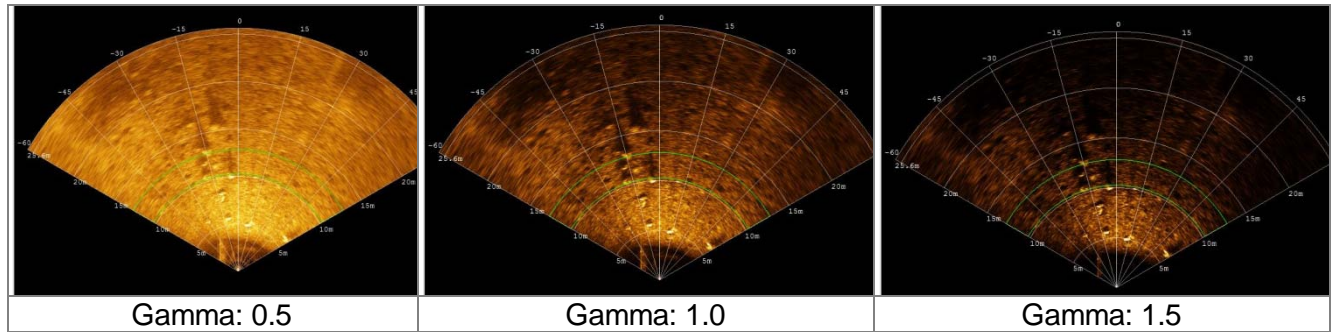


Figure 39. Brightness and Gamma Rendering Effects

7. Drag the Feathering slider bars to the left and right.
- Adjusting the horizontal feathering varies the sharpness of port and starboard boundaries at overlapping swaths, while adjusting the vertical feathering affects the clarity of the entire image (Figure 38).

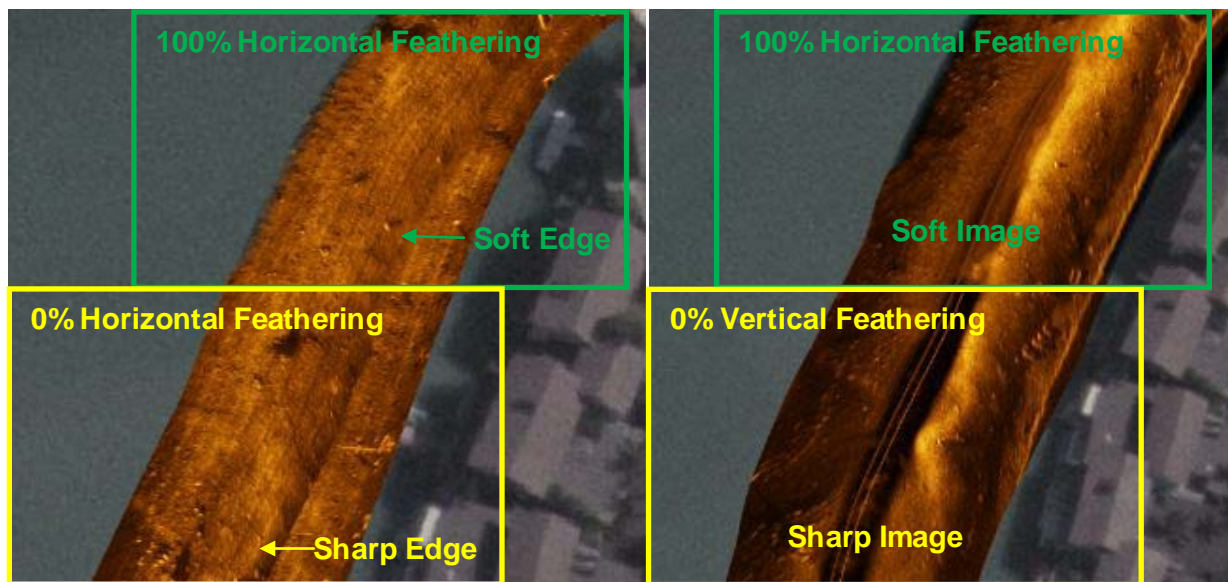


Figure 40. Feathering Effect

This page is intentionally left blank.



## 8 Work with Contacts

One purpose of post-processing data is to enhance the imagery sufficiently to maximize detection of contacts. Contacts are objects the user tags in the PPI, for which SMM stores the location, sonar image, and other properties. SMM enables enlargement, enhancement, measurement, and classification of these contacts in the Contacts window or database. In addition, SMM can export contact images and associated user-supplied information in an \*.html or \*.xml report.

This section describes the contact analysis workflow and the elements of the Contacts window as they are used in the process. It concludes with a brief tutorial to guide interaction with SMM's contact features. The general contact workflow is to:

1. Mark contacts
2. Adjust the contact display
3. Attribute, or provide data about, the contacts
4. Organize the contacts
5. Export a contact report

### 8.1 Mark Contacts

To build your contact database, you must first mark the contacts. You can mark the contacts during acquisition or playback mode, to catch what you may have missed during the survey. Marked contacts appear as small blue tacks on an image in the mosaic window, as shown in Figure 39. The contact imagery is a square with a ten meter edge centered on the marked position, from the swath of origin. The contact, marked position, and all other associated properties are saved locally in the contact database, for later classification, organization, and export.

To mark a contact in acquisition or playback mode:

1. Double-click on the object in the Forward Look window PPI.
  - A contact thumbnail is saved in the database.
  - The thumbnail appears in the mosaic window.
  - A small blue marker appears over the mosaic, marking the recorded position of the contact.

To turn on/off the display of the blue tacks or the images:

1. Click the **Display options** icon
2. Click the box next to **Mark position with a pin** or **Render the image over the swaths**.



Figure 41. Contacts in Mosaic Window

### 8.2 Elements of the Contacts Window

Click the **Contacts** icon to open the contact database. Elements of the Contacts window are labelled in Figure 40. This section introduces the elements of the contact window and covers the Contacts window display options. How to use these elements in the contacts workflow will be described in the following sections.

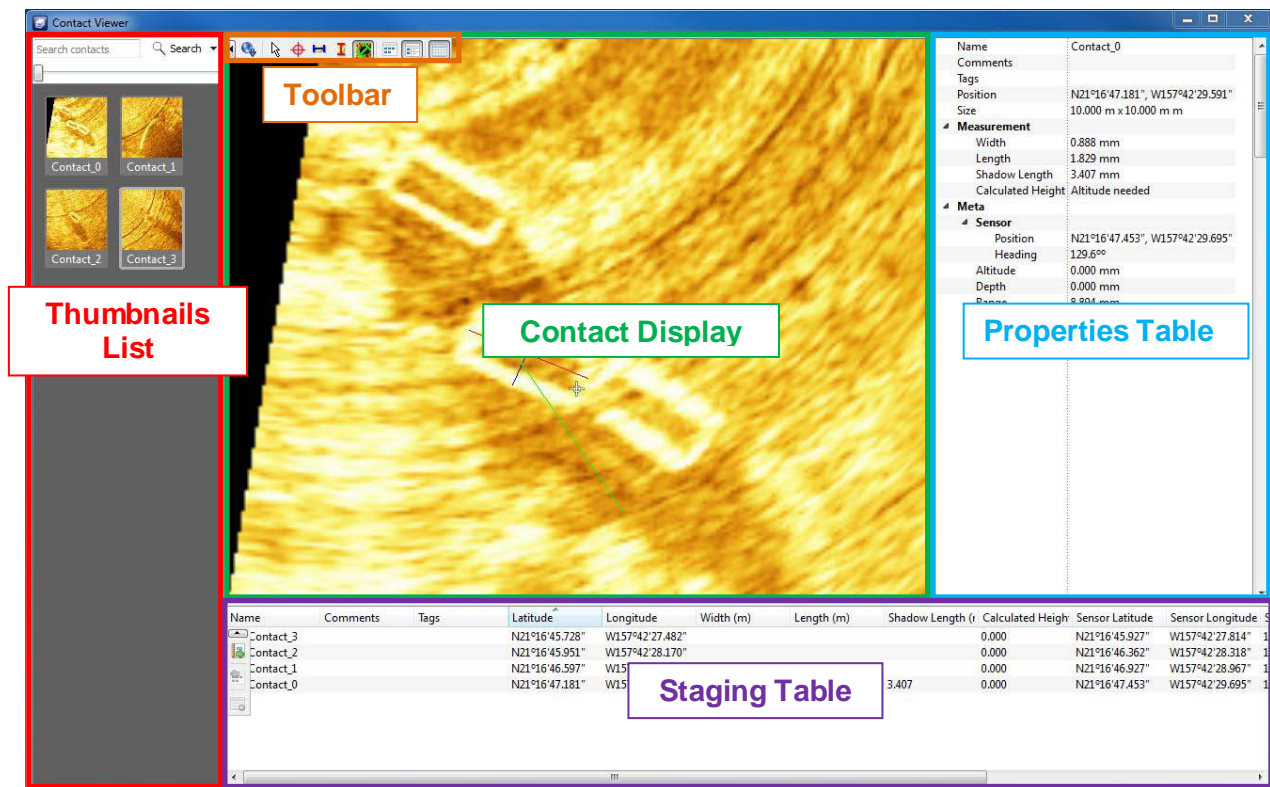


Figure 42. Contacts

The Contacts window contains the contact thumbnails list, a toolbar, the contact display with associated properties table, and the staging table. Contacts that you have marked are visible in the contact thumbnails list (unless you have previously set a filter in the search bar), but the contact display, properties table, and staging table do not open by default. Each element of the Contacts window can be resized by hovering over the edge of the panel, and clicking and dragging.

### 8.2.1 Thumbnails List

Thumbnails are smaller views of the contact in the thumbnails lists. To adjust the size of the thumbnails, click on the slider bar and drag to the desired size. From the list, you classify contacts and control the display of contacts in other elements of the Contacts window. The context menu includes commands to rename, edit comments, assign new tags, filter by tag, add contacts to the staging table, or delete contacts. Right-click on a thumbnail to access this menu.

When you click or right-click on a thumbnail, this selects the contact and displays it in the contact display. To control which contacts display:










- Select multiple adjacent contacts by clicking on the first thumbnail, holding Shift and clicking on the last thumbnail.
- Select multiple non-adjacent contacts by clicking on a thumbnail, then holding Ctrl and clicking on each thumbnail.
- Select all contacts by clicking on a thumbnail, then pressing Ctrl+A.
- Remove all contacts from the contact display by clicking in the gray space in the thumbnail list.

These standard Windows selection commands also apply to selecting multiple contacts for context menu options.

### 8.2.2 Toolbar

The icons in the Contacts toolbar are pictured and described in Table 15. To hide the toolbar, click the small Left arrow at the extreme left of the toolbar.

**Table 15. Contacts Toolbar Icons**

Icon	Icon Name	Function
	Import contacts	Import contacts from another SAMM project to the current project
	Zoom cursor	Suppress selection mouse commands and activate navigation commands
	Mark the Internav contact center	Change the recorded position of the contact
	Contact width	Measure the width of the contact and save it as an attribute
	Contact length	Measure the length and save it as an attribute
	Shadow length	Measure the shadow length and save it as an attribute
	Tiles	Show only selected thumbnails in the display
	Properties	Show or hide the properties table for the selected contacts
	Staging Table	Show or hide the staging table

### 8.2.3 Contact Display

The contact display shows tiles, or a larger view of selected thumbnails. In the display, you can use the measuring tools to attribute the contact dimensions, and mark the contact center. You can also access the same commands on the display context menu as in the thumbnail context menu and the toolbar.

You may use your keyboard or mouse to navigate within the contact display. To zoom in on an area, either click the **Pan/Zoom** icon in the toolbar or right-click on the tile and click **Pan/Zoom**. Then, hold Shift and click and drag a box around the area. To zoom in/out from the tile center, either:

- roll the mouse wheel away from/toward you;
- press the -/Shift++ keys; or
- on a laptop track pad, use a two finger scroll toward/away from you.

To zoom out to show the full tile, press the space bar. You may also use the **Pan/Zoom** tool to pan, then hold Ctrl and click and drag in the contact display. The areal pan and zoom methods work without activating the **Pan/Zoom** tool from the icon or the context menu.

### 8.2.4 Properties Table

The properties table shows the attributes of each selected contact in a report view, adjacent to the contact display. The **Name**, **Comment**, **Altitude**, and **Depth** fields are directly fillable in the properties table. **Position**, **Size**, **Sensor Position**, **Sensor Heading**, and **Range** are defined by the contact mark. **Position** and **Range** automatically update if the **Mark the Internav contact**

**center** tool is used to move the recorded contact. The **Tag** field is defined from the contact thumbnail list, and the **Width**, **Length**, and **Shadow Length** fields are filled when the user executes the measure tools. The **Calculated Height** field auto fills when the user enters an altitude.

To show/hide the properties table, click the **Properties/Tiles** icon or right-click on a tile and click **Properties/Tiles**.

### 8.2.5 Staging Table

The staging table shows a table view of the properties of each contact sent to it. The contact properties that are shown in the Properties table in report view, from top to bottom, appear by default from left to right as columns in the staging table. Use the staging table to export contacts as a report.

To show or hide the staging table, click the **Staging table** icon. Adding contacts to the staging table also automatically displays the staging table. To do this, right-click on a tile or selected thumbnails and click **Add contact(s) to staging table**.

A small toolbar hosts icons for the staging table commands. These commands are also found on the staging table context menu. They are:

- remove contact(s) from the staging table;
- show only contacts selected in the staging table in the thumbnail list and contact display; and
- export contacts in a report.

To hide the toolbar, click the small Up arrow at the top of the toolbar.

Format the staging table by adjusting column width, hiding/unhiding columns, sorting, and rearranging column order.

- To resize columns, hover over the column break line, click, and drag.
- To hide/unhide columns, right-click on the column name row and click the checkbox next to the field name.
- To sort a column, click on the column name.
- To rearrange the column order, click on a column name and drag it to the desired location.

### 8.2.6 Contact Display Commands

For quick reference, the display options available in the Contacts utility are listed in Table 16. The methods available to execute the commands are bulleted to clarify when multiple execution methods exist.

**Table 16. Contact Display Commands**

Contacts Window Element	Command	Action
All	Resize elements	<ul style="list-style-type: none"> <li>• Hover over the element edges and click and drag.</li> </ul>
	Show/hide the properties table	<ul style="list-style-type: none"> <li>• In the toolbar, click the <b>Properties/Tiles</b> icon</li> <li>• In the contact display, right-click on the contact and click <b>Properties/Tiles</b>.</li> </ul>
	Show/hide the staging table	<ul style="list-style-type: none"> <li>• In the toolbar, click the <b>Staging table</b> icon</li> </ul>

Contacts Window Element	Command	Action
	Show/hide toolbars	<ul style="list-style-type: none"> <li>Click the arrow icon at the left or top of the toolbar.</li> </ul>
<b>Contact Display</b>	Add contacts to contact display	<ul style="list-style-type: none"> <li>In the thumbnail list, click on the thumbnail to select it.</li> </ul>
	Add all contacts to the contact display	<ul style="list-style-type: none"> <li>In the thumbnail list, click on any thumbnail and press Ctrl+A.</li> </ul>
	Add multiple nonadjacent contacts to the contact display	<ul style="list-style-type: none"> <li>In the thumbnail list, click on the first thumbnail, hold Ctrl and click on each thumbnail.</li> </ul>
	Add multiple adjacent contacts to the contact display	<ul style="list-style-type: none"> <li>In the thumbnail list, click on the first thumbnail, hold Shift and click on the last thumbnail.</li> </ul>
	Remove all contacts from contact display	<ul style="list-style-type: none"> <li>Click in the grey space of the thumbnail list.</li> </ul>
<b>Thumbnail List</b>	Resize thumbnails	<ul style="list-style-type: none"> <li>In the thumbnail list, click on the slider bar and drag.</li> </ul>
<b>Thumbnail List and Contact Display</b>	Show only those contacts in the staging table in the thumbnail list and contact display	<ul style="list-style-type: none"> <li>In the staging table, select the contacts to show and click the <b>Show contact(s)</b> icon in the toolbar.</li> <li>In the staging table, select the contacts to show, right-click and click <b>Show contact(s)</b>.</li> </ul>
<b>Contact Display</b>	Zoom in on area	<ul style="list-style-type: none"> <li>In the toolbar, click the <b>Pan/Zoom</b> icon, hold Shift, and in the contact display click and drag a box around the area.</li> <li>In the contact viewer, right-click on the tile and click <b>Pan/Zoom</b>, hold Shift, and click and drag a box around the area.</li> </ul>
	Zoom in to center	<ul style="list-style-type: none"> <li>In the contact display, roll the mouse wheel away from you.</li> <li>In the contact display, press the - key.</li> <li>In the contact display, use a two finger scroll toward you on a laptop track pad.</li> </ul>
	Zoom out from center	<ul style="list-style-type: none"> <li>Roll the mouse wheel toward you.</li> <li>Press the Shift++ keys.</li> <li>Use a two finger scroll away from you.</li> </ul>
	Zoom to contact	<ul style="list-style-type: none"> <li>In the contact display when zoomed in, press the spacebar.</li> </ul>
	Pan	<ul style="list-style-type: none"> <li>In the toolbar, click the <b>Pan/Zoom</b> icon, hold Ctrl, and in the contact display click and drag.</li> <li>In the contact display, hold Ctrl and click and drag.</li> </ul>

Contacts Window Element	Command	Action
Staging Table	Add contacts to the staging table	<ul style="list-style-type: none"> <li>In the contact display, right-click on the tile and click <b>Add contact(s) to staging table</b>.</li> <li>In the thumbnail list, right-click on the selected thumbnails and click <b>Add contact(s) to staging table</b>.</li> </ul>
	Resize columns	<ul style="list-style-type: none"> <li>Hover over the column break line, click, and drag.</li> </ul>
	Hide/Unhide Columns	<ul style="list-style-type: none"> <li>Right-click on the column name row and click the checkbox next to the field name.</li> </ul>
	Rearrange the column order	<ul style="list-style-type: none"> <li>Click on a column name and drag it to the desired location.</li> </ul>

## 8.3 Attribute Contacts

SAMM enables you to make complete contact reports through classification and measurement of the contacts. These processes are used to define contact properties, so that data about the contacts may be transmitted with the images through your workflow.

### 8.3.1 Classify Contacts

The first step of attributing your contacts is to classify them with comments and tags. These are user-defined properties that give context to the image and enable sorting, filtering, and identification of each contact for later review and export. The comment field is a text field for entering any text description that suits your purpose. Tags are labels used to filter and sort your contact database.

#### 8.3.1.1 Add Comments

Add a comment two different ways:

- In the thumbnail list, right-click on a thumbnail and click **Edit comments**. Enter the comment and press Enter/click **Okay**.
- In the properties table, click in the **Comments** field. Enter the comment and press Enter.

#### 8.3.1.2 Add Tags

Before adding tags, think about how you would like to be able to sort your data. Your classification system is only as useful as you make it. For example, you may make tags for unknown, wreck, cinder block, diver, ordnance, etc. to be able to filter and sort contacts by the type of object they represent. Or, define tags using location identifiers or swath number if you have a need to sort by location. If the purpose of your survey was to identify and locate disposed ordnance, for example, you would obviously define tags for as many different ordnance types as are recognizable.

In the interest of good record keeping, you may want to define tags that will be applicable to future surveys. Once tags are defined, you can filter by the tag and send only the contacts with a certain tag to the staging table for reporting. You may assign more than one tag to contacts.

To get started tagging, define the tags in the database. This can be done with or without concurrently assigning the newly defined tag to a selected contact.



- In the thumbnail list, click the **Search** drop down menu and click **Create Tag**. Enter the tag name and click **OK**. This adds the tag to the database.
- Right-click on a thumbnail/tile, hover over **Tags** and click **Assign new tag**. Enter the tag name and click **OK**. This adds the new tag to the contact and the database.

Then, apply the tags to relevant contacts. As you may have gathered, this can be performed with or without concurrently defining a tag in the database.

- Right-click on a thumbnail/tile, hover over **Tags** and click **Assign new tag**. Enter the tag name and click **OK**. This adds the new tag to the contact and defines it in the database.
- Right-click on a thumbnail/contact, hover over **Tags** and click the checkbox next to any tags to check it (Figure 41). Click anywhere outside the context menu to hide the menu.

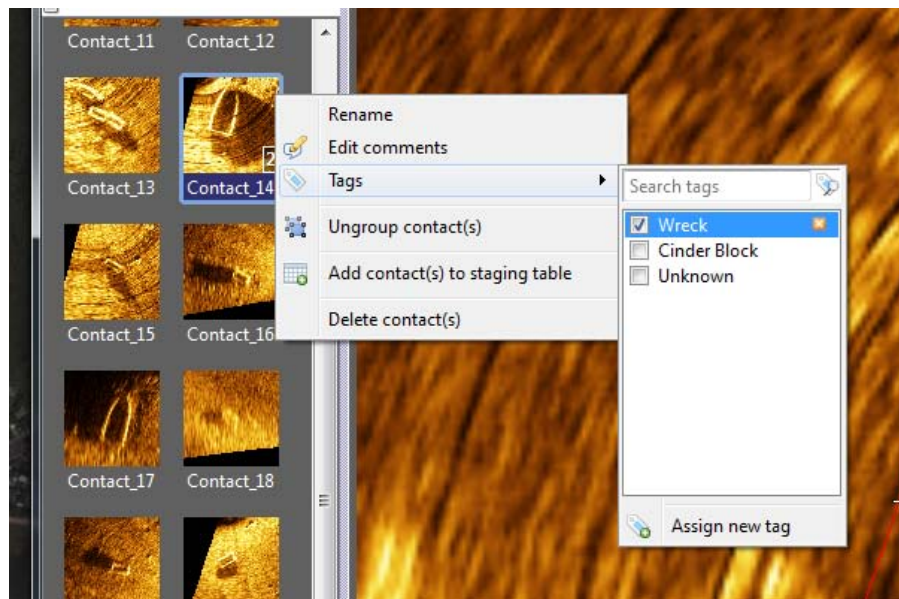


Figure 43. Assigning Tags

### 8.3.2 Measure Contacts

Three measure tools, accessed from the toolbar, can be used to precisely measure targets in the SAMM contact utility. The measure tool transforms the cursor into a line that you draw over the contact. The three measuring lines have distinct colors to symbolize the width (blue), length (red), and shadow length (green). Match these colors to the object dimensions consistently to ensure the accuracy of your contact measurement properties.

To change the cursor behavior to measuring, either click on one of the measuring icons in the toolbar or right-click on a tile and click one of the measure commands. To measure the contact, click on one edge of the contact then drag the mouse to the opposite edge. SAMM draws a line as you drag the mouse. When measuring shadow length, make sure that you click on the beginning of the shadow, closest to the object, and drag the mouse *in the direction the shadow is cast*. The distances are displayed in the properties table.

### 8.3.3 Calculate Contact Height

In order to calculate the contact height, the sensor altitude at the contact's position and shadow length must be known. To calculate the height, enter the altitude in the **Altitude** field of the properties table in the unit shown and measure the shadow length. SAMM uses these values to calculate the height. It is displayed in the **Height** field.

### 8.3.4 Change Position

SAMM fills in the lon/lat position of the contact using the initial contact mark. You may edit this position by using the Mark the Internav contact center tool. To change the cursor behavior to marking the contact center, either click the **Mark the Internav contact center** icon or right-click on the tile and click **Center**. Then, click the new center on the contact display. The newly marked position updates in the properties table.

### 8.3.5 Rename Contacts

Naming contacts provides another way to sort the contacts, because the naming column may be sorted alphabetically in the contact staging table. By default, SAMM names each contact `Contact_X` where X is the sequence in which contacts were created. To rename the contact,

- in the thumbnail list, right-click on a thumbnail and click **Rename**. Enter the name and press Enter; or
- in the properties table, click in the **Name** field. Enter the name and press Enter.

### 8.3.6 Contact Attribution Commands

Table 17 provides a quick reference of the attribution commands and methods of executing the commands. The methods available to execute the commands are bulleted to clarify when multiple execution methods exist.

**Table 17. Contact Attribution Commands**

Command	Action
Rename	<ul style="list-style-type: none"> <li>• In the thumbnail list, right-click on a thumbnail and click <b>Rename</b>. Enter the name and press Enter.</li> <li>• In the properties table, click in the <b>Name</b> field. Enter the name and press Enter.</li> </ul>
Add comment	<ul style="list-style-type: none"> <li>• In the thumbnail list, right-click on a thumbnail and click <b>Edit comments</b>. Enter the comment and press Enter/click <b>Okay</b>.</li> <li>• In the properties table, click in the <b>Comments</b> field. Enter the comment and press Enter.</li> </ul>
Define tag in database	<ul style="list-style-type: none"> <li>• In the thumbnail list, click the <b>Search</b> drop down menu and click <b>Create Tag</b>. Enter the tag name and click <b>OK</b>.</li> <li>• Also in the thumbnail list, right-click on a thumbnail, hover over <b>Tags</b> and click <b>Assign new tag</b>. Enter the tag name and click <b>OK</b>. This adds the new tag to the contact and the database.</li> </ul>



Command	Action
Assign tag to contact	<ul style="list-style-type: none"> <li>• In the thumbnail list or the contact display, right-click on a thumbnail/contact, hover over <b>Tags</b> and click <b>Assign new tag</b>. Enter the tag name and click <b>OK</b>. This adds the new tag to the contact and the database.</li> <li>• Also in the thumbnail list or the contact display, right-click on a thumbnail/contact, hover over <b>Tags</b> and click the checkbox next to any tags to check it. Click anywhere outside the context menu to hide the menu.</li> </ul>
Remove tag from contact	<ul style="list-style-type: none"> <li>• In the thumbnail list or contact display, right-click on a thumbnail/contact, hover over <b>Tags</b> and click the checkbox next to any tags to uncheck it. Click anywhere outside the context menu to hide the menu.</li> </ul>
Mark the Internav contact center	<ul style="list-style-type: none"> <li>• In the toolbar, click the <b>Mark the Internav contact center</b> icon. Click the new center on the contact display.</li> <li>• In the contact display, right-click and click on <b>Center</b>. Click the new center on the contact display.</li> </ul>
Measure width	<ul style="list-style-type: none"> <li>• In the toolbar, click on the <b>Measure Width</b> icon. Click on the extreme edge of the widest part of the object in the contact display, drag the mouse to the opposite edge, and release the mouse button.</li> <li>• In the contact display, right-click on the contact in the display and click <b>Width</b>. Click on the extreme edge of the widest part of the object in the contact display, drag the mouse to the opposite edge, and release the mouse button.</li> </ul>
Measure length	<ul style="list-style-type: none"> <li>• In the toolbar, click on the <b>Measure Length</b> icon. Click on the extreme edge of the object in the length dimension, drag the mouse to the opposite edge, and release the mouse button.</li> <li>• In the contact display, right-click on the contact in the display and click <b>Length</b>. Click on the extreme edge of the object in the length dimension, drag the mouse to the opposite edge, and release the mouse button.</li> </ul>

Command	Action
Measure shadow length	<ul style="list-style-type: none"> <li>In the toolbar, click on the <b>Measure Shadow Length</b> icon. In the contact display, click on the beginning of the shadow, closest to the object, and drag the mouse <i>in the direction the shadow is cast</i>. Release the mouse button at the far edge of the shadow.</li> <li>In the contact display, right-click on the contact and click <b>Shadow length</b>. Click on the beginning of the shadow, closest to the object, and drag the mouse <i>in the direction the shadow is cast</i>. Release the mouse button at the far edge of the shadow.</li> </ul>
Calculate Height	<ul style="list-style-type: none"> <li>In the Properties table, enter the altitude of the sensor at the approximate time and position that the contact was marked in the unit shown in the <b>Altitude</b> field.</li> </ul>

## 8.4 Group Contacts

Your survey will most likely generate multiple images of the same object. You may have noticed this while you were attributing your contacts. Using SAMM's grouping feature on multiple images of the same object defines a relationship between contacts in the database. To group contacts, click on a thumbnail in the thumbnail list and drag it over another thumbnail, then release the mouse button. The receiving contact becomes the group reference. No observations are deleted; the other grouped contacts are kept.

The clearest, most accurate contact should be used as the group reference, because it is the contact that holds the attributes for the group. The properties of the other grouped contacts are suppressed in the staging table. To change the group reference, right-click on the tile in the contact display and click **Set as group reference** (Figure 42). You may ungroup contacts by right-clicking on the thumbnail or contact tile and clicking **Ungroup contacts**.

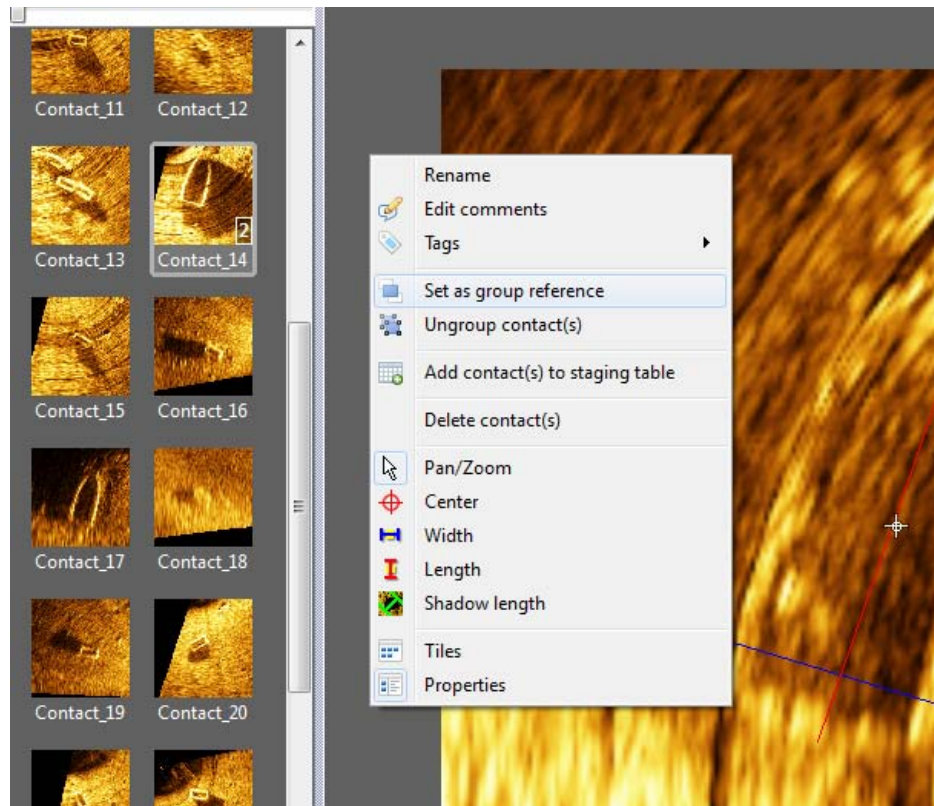


Figure 44. Grouped Contacts and Context Menu

After you have removed redundancies in your dataset by grouping unique objects, you are ready to export the contacts.

## 8.5 Export Contacts

The staging table, as the name implies, controls which contacts are exported to the \*.html and \*.xml reports.

### 8.5.1 Send contacts to the staging table

To efficiently add contacts to the staging table, limit the thumbnail list by searching and filtering, then batch select the contacts. Searching the thumbnail list hides all of the contacts that do not match the search terms. To search by name, enter the name in the **Search** field. You may also search the tags list for tag names. To do this, either click on the **Search** dropdown menu in the thumbnail list, or right-click on a thumbnail/tile and hover over **Tags**. Then, enter the name of the tag in the field. Clear the search using the **Clear search** button.

You may also filter by tag to limit the thumbnails shown in the list. To do this, access the tags window in the same way by either clicking on the **Search** dropdown menu in the thumbnail list, or right-clicking on a thumbnail/tile and hovering over **Tags**. Then, click the checkbox next to the tag whose thumbnails you want to keep in the thumbnail list. Or, enter `tags: //` and then the name of the tag in the search bar (Figure 43).

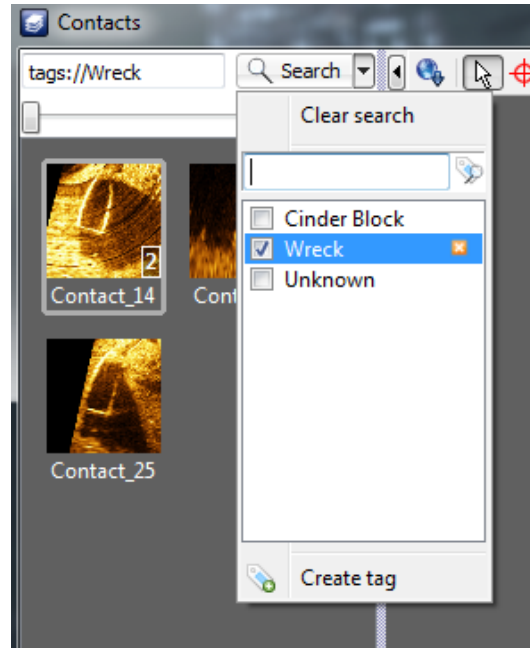


Figure 45. Filtering by Tag

To send contacts to the staging table, right-click on the selected thumbnails/tiles and click **Add contact(s) to staging table**. You can select all, multiple adjacent, or multiple non adjacent thumbnails in the same way as viewing them in the contact display (Section 8.2). The staging table will appear at the bottom of the Contacts interface, with contact and properties displayed in a tabular form.


### 8.5.2 Prep the Staging Table

*At this time, most of the formatting functions in the staging table are for display purposes only.* The order of the contacts in the table, however, is preserved in the report. Sort the table by clicking on the column name. Text fields sort alphabetically while numeric fields sort sequentially, in ascending or descending order. A small up arrow signifies ascending, while a small down arrow signifies descending.

To remove contact(s) from the staging table, select them in the table and either click the **Remove contact(s) from staging** table icon or click this command on the right-click context menu. You may also choose to limit the display of thumbnails and tiles to those present in the staging table; use the **Show contact(s)** icon or context menu command to perform this action for contacts selected in the staging table. This assists in building your report because it shows you which images will be exported.

### 8.5.3 Export a Report

You can export reports in \*.html and \*.xml format from the staging table. To build the report:

1. In the staging table, sort the table to set the report order.
2. Click the **Export report** icon (  ).
3. In the Create Report window, navigate to the file location to save your report. The default file location is the project folder.
4. Enter a file name.
5. Click **Save**.

When you click Save, a popup window greets you with a successful report notification (Figure 44). Accept the message by clicking **OK** or view the report in a browser by clicking **Open**.

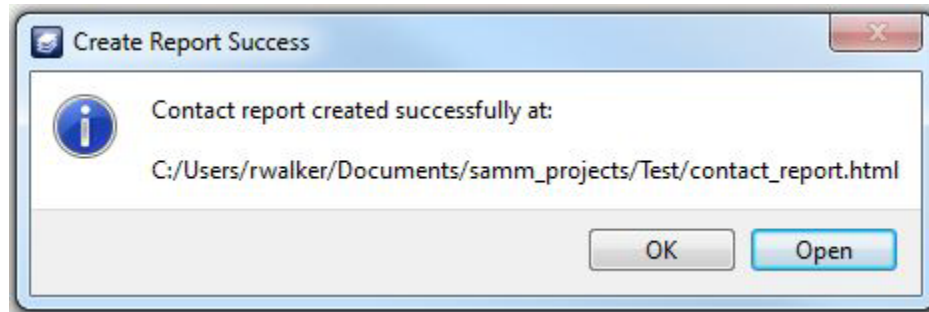


Figure 46. Create Report Success Window

The report export function creates a folder and two files in the project folder: one \*.html file, one \*.xml file of the same name, and one folder of the same name with "\_images" appended to the name. This folder contains the \*.png tiles of each contact. The \*.html file contains each contact tile with its attributes displayed on the right in report form. *At this time, the report includes the Name, Time, Lon/Lat, Easting/Northing, Range, Heading, Sonar Altitude, Sonar Depth, Image Resolution, Measured Width, Measured Length, Measured Shadow, Height from Shadow, and Comment fields.*

#### 8.5.4 Delete Contacts

When reviewing the contacts, you may find contacts that are irrelevant to your purpose. If you desire to delete the contacts, select the contact(s), right-click on the selected thumbnails/tiles and click **Delete contact(s)**. Deletion is permanent. As an alternative to deletion, you may choose to export these contacts before deleting them from the project so that they are preserved in report form. A less efficient way of recovering deleted contacts is to remark them in playback mode.

### 8.5.5 Contact Organization Commands

Table 18 lists the organization commands and the methods to execute them as a quick reference. The multiple methods available to execute the commands are bulleted.

**Table 18. Contact Organization Commands**

<b>Command</b>	<b>Action</b>
Group contacts	<ul style="list-style-type: none"> <li>In the thumbnail list, click and drag the thumbnail over the group reference contact.</li> </ul>
Ungroup contacts	<ul style="list-style-type: none"> <li>In the thumbnail list or contact display, right-click on the thumbnail/contact and click <b>Ungroup contact(s)</b>.</li> </ul>
Set group reference	<ul style="list-style-type: none"> <li>In the contact display, right-click on the thumbnail/contact and click <b>Set as group reference</b>.</li> </ul>
Search by name	<ul style="list-style-type: none"> <li>In the thumbnail list, enter the search term in the <b>Search contacts</b> field.</li> </ul>
Search by tag	<ul style="list-style-type: none"> <li>In the thumbnail list, click on the <b>Search</b> dropdown menu, then enter the tag name in the field.</li> <li>In the thumbnail list or contact display, right-click on a thumbnail/contact, hover over <b>Tags</b> and enter the tag name in the field.</li> </ul>
Filter contacts by tag name	<ul style="list-style-type: none"> <li>In the thumbnail list, click the <b>Search</b> dropdown menu and click the checkbox next to the tag.</li> <li>In the thumbnail list or contact display, right-click on a thumbnail/contact, hover over <b>Tags</b> and click the checkbox next to the tag.</li> </ul>
Add contacts to staging table	<ul style="list-style-type: none"> <li>In the thumbnail list, select contacts (single, multiple adjacent, multiple non adjacent, all) then in the thumbnail list, right-click on the thumbnail/tile and click <b>Add contact(s) to staging table</b>.</li> <li>In the contact display, right-click on a tile and click <b>Add contact(s) to staging table</b>.</li> </ul>
Sort by column	<ul style="list-style-type: none"> <li>In the staging table, click on the column name.</li> </ul>
Remove contact(s) from staging table	<ul style="list-style-type: none"> <li>In the staging table, click on the contact(s) to select, then click the <b>Remove contact(s) from staging table</b> icon</li> <li>In the staging table, click the contact(s) to select, then right-click and click <b>Remove contact(s) from staging table</b>.</li> </ul>
Show only those contacts in the staging table in the thumbnail list and contact display	<ul style="list-style-type: none"> <li>In the staging table, select the contacts to show and click the <b>Show contact(s)</b> icon in the toolbar.</li> <li>In the staging table, select the contacts to show, right-click and click <b>Show contact(s)</b>.</li> </ul>

Command	Action
Delete contact(s)	<ul style="list-style-type: none"> <li>In the thumbnail list, right-click on selected thumbnails and click <b>Delete contact(s)</b>.</li> <li>In the contact display, right-click on a tile and click <b>Delete contact(s)</b>.</li> </ul>
Export a report	<ul style="list-style-type: none"> <li>In the staging table, sort by column to set the report order, then click the <b>Create report</b> icon. Enter a file name, change the file location if desired, click Save, and then click <b>OK</b> to return to the Contacts window or <b>Open</b> to view the *.html report in a browser.</li> </ul>

## 8.6 Contacts Tutorial

This example demonstrates some of the contact features available in OIC's SAMM. Follow the directions with the sample data to learn to mark contacts, measure them, and create a report.

- Look for something interesting in your Forward Look window PPI. Double-click on it.
  - A small blue tack appears in the corresponding location in the mosaic window.
- Mark three more targets in the same manner.
- Click the **Contact** icon.
  - The Contacts window opens. Not all elements of the Contacts window are visible yet.
- Click on the **Contact\_0** thumbnail.
  - The contact displays in the contact view.
- Click the **Properties** icon on the toolbar (mouse over the buttons to see the names.)
  - The properties table opens on the right side of the Contacts window.
- Click the **Measure Width** icon on the toolbar. Click on the extreme edge of the widest part of the target, drag the mouse to the opposite edge, and release the mouse button.
  - A blue line appears, representing the contact width.
  - The width field in the right panel displays the width in millimeters.
- Measure the length and shadow length in the same manner. Measure the shadow in the direction the shadow is cast. You can enter the altitude, if known, in the properties table to calculate the height of the target.
- Right-click on the contact icon and select **Add contact(s) to staging table**.
  - The staging table appears at the bottom of the Contacts window, with attribute information in a tabular view.
- Click on **Contact\_1** to select it. Hold Shift and click on **Contact\_3** to select the second, third, and fourth contacts. Right-click and select **Add contact(s) to staging table**.
  - SAMM adds the contacts to the staging table. The Width (m), Length (m), and Shadow Length (m) fields are blank for contacts that you have not measured.
- Right-click on any of the field names. Uncheck Sensor Latitude and Sensor Longitude.
  - They are no longer displayed in the table. This works for any column.
- Click on the Latitude column.
  - SAMM sorts the table by ascending latitude. This works for any column.
- Click the **Create report** button. Enter a file name and set the file location and click **Save**.
  - SAMM exports an .html file with images.
- Close the Contacts window.

This page is intentionally left blank.



## 9 Additional Features

SAMM has three additional features present in the toolbars: the Properties window, export tool, and measure tool. *The measure tool is not yet available, and the Properties window displays Gemini sonar properties.* The measure tool can be used to measure any portion of the mosaicked imagery in linear units.

### 9.1 Export Tool

The export tool integrates SAMM directly into your workflow, no matter which spatial analysis software package you use, by exporting in the widely readable GeoTIFF format or the freely accessible Google Earth format. The tool saves the mosaic as a geocoded image as it appears in the mosaic window, with respect to swath layering and rendering properties. To export your mosaic, access the Export dialog from the **Export** icon.

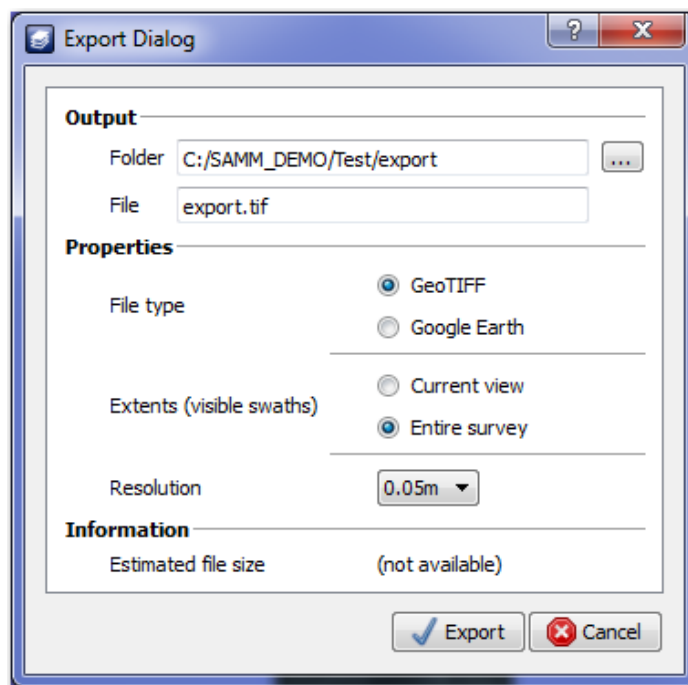


Figure 47. Export Dialog

The file path and name of the export file defaults to the project folder and names the file `export`. You may change the path by entering the new path into the **Path** field or clicking the ... button. Change the file name by entering it in the **File** field. The remaining file export options are available in the Properties subpanel of the export window. These include the file type, extent, and resolution. The export dialog also displays an estimate of the exported file size (*not yet implemented*).

#### 9.1.1 File Type

SAMM supports export to GeoTIFF (\*.tif or \*.tiff) and Google Earth (\*.kmz) formats. Tagged-Image File Format (TIFF) files are a raster imagery file type. Rasters, as mentioned in Section 5.2, store data in a grid of pixels. GeoTIFFs are TIFFs with geographic tags embedded in the file, so the data (image that you see) and metadata (location information that allow placing the

file on a map) are encoded in the same file. The format is an industry standard, and GeoTIFFs created in SAMM can be read in any program that reads GeoTIFFs as well as regular TIFFs (in most circumstances).

GoogleEarth files are the native file type for Google's mapping program. SAMM's \*.kmz export can be added to a GoogleEarth map for further analysis or creating maps for reports.

## 9.1.2 Extent

The user may elect to export the visible extent of the mosaic or the entire survey. If you would like to limit the exported data to the extent of the mosaic window, set the extent of the mosaic window before opening the export tool.

## 9.1.3 Resolution

The resolution options are 5 centimeters (cm), 10 cm, 20 cm, 40 cm, 80 cm, 1.6 m, or 3.2 m. Because higher resolution images mean larger file sizes, plan on SAMM taking more time to export images of higher resolution.

## 9.1.4 Export Tutorial

This brief tutorial demonstrates how to export a mosaic file.

1. Arrange the swaths with the clearest images on top (click and drag from the Swath list-see Section 7.2).
2. If you do not want to export the entire mosaic at once, pan and zoom in the mosaic window until the window only shows the extent of the mosaic for export.
3. Click the **Export** icon.
  - The Export Dialog displays.
4. In the Path field, change the path of the file by clicking the ... button. In the Export window, navigate to the desired folder and enter the file name. Click **Save**.
5. In the **Properties** field, choose either **GeoTIFF** or **Google Earth**.
6. In the **Extents (visible swaths)** field, choose either **Current view** or **Entire survey**.
7. In the **Resolution** field, pick the desired resolution from the dropdown menu (*not yet implemented*).
8. Click **Export**.
  - SAMM function is halted while it builds the export file.

## 10 End Acquisition and Close Project

To stop data playback, or acquisition, and close the project:

1. Click the **Pause** button on Playback Controls to end playback, or click the **Record toggle** icon on the main toolbar to stop logging data in acquisition mode.
  - SAMM stops painting swaths behind the vessel.
2. Click the **Close Project** icon.
  - SAMM saves the project automatically before returning to the opening screen.
3. Click **Close** to exit SAMM.